The
Electrical Review

VOL. CXX JANUARY 15, 1937. No. 3086

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, SEDIST, LONDON." Code, A B C. Telephone No.: Waterloo 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

Classified Advertisements-Official Notices-Tenders—Supp. 21.

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The Coronation Illuminations

NEVER before has electricity had so great an opportunity of demonstrating its suitability for a special purpose to so many millions of people, on one special occasion, as will present itself in connection with the celebrations attending the Coronation of King George VI in May next.

We believe that the electrical industry is fully conscious of this fact, for in the course of our preparations for the publication of this special issue of the ELECTRICAL REVIEW we have found substantial evidence of a great activity that has been, and is, proceeding behind the scenes, and other that is just beginning, in many factories and workshops, in the minds and offices of contractors and other installation engineers, as well as in electricity supply departments throughout the country.

The pardonable temporary delay imposed by conditions beyond their control towards the end of last year has prevented some members of the trade and some supply authorities from acquainting us with their plans as promptly as they, and we, wished, but we shall have an opportunity of supplementing the volume of material made available to the reader to-day, by recording further new plans and products during the next few weeks.

The value of this Special Issue, appearing four months in advance of the great event, consists not only in the placing before the trade of particulars of signs, apparatus and accessories that are ready to be purchased, but in the help that it affords to those who are still engaged in producing, or even only deliberating upon, plans and designs for decorative illumination schemes.

As Mr. H. M. Drake remarks in his article on "The Electrical Contractor's Part," on page 80, no other system of illumination can offer such a diversity of design and display as electricity. But May is only four months away and no time must be lost in making our preparations, whatever our particular class of work; it is for that reason that we have not changed our original plans for dealing with the subject on this particular date.

We are justified in anticipating the most beautiful and the most widespread electrical illumination effects—the best demonstration ever staged either at home or overseas. The experience of the last few years, especially that of the Royal Jubilee illuminations in 1935, has taught the electrical world much in this connection. Though the old-established lines possessed merits, the passing years have brought many new departures and developments, such as neon lighting and floodlighting, and now 1937 furnishes us with the opportunity ot embodying still newer ideas.

Originality and more artistic imagination will, we hope, result in the conception of some magnificent planning of co-operative and other lighting schemes, possessing marked individuality appropriate to widely different thoroughfares and rivers, cities and villages. Mr. H. T. Young's remarks on this aspect of the matter may be commended to the careful attention of electrical and other authorities. Architectural taste combined with the knowledge of the electrical engineer is the most desirable form of co-operation in this connection.

When so many hundreds of thousands of installations for public and private orders mean desirable business, done more or less under pressure, it is to be hoped that there will not only be plenty of work and good wages, but also satisfactory profits. We need to be on our guard against the danger of the industry being robbed of the advantage that such an occasion offers, by the deplorable practice of undercutting prices whether of manufactured goods or of installation work. The Coronation is an event for which the use of British-made goods is peculiarly appropriate; if this policy be generally acted up to there need be little likelihood of cheap, shoddy and dangerous work. Temporary work should not be "cheap and nasty"; one would rather see no display at all than one which will bring discredit upon the industry.

No False Economy

MR. H. R. TAUNTON, in his article on p. 81 stresses the importance of sound material and workmanship. Better, he says, in effect, to lose money than reputation. He makes a number of cogent comments on those regulations which apply more particularly to installations of a temporary character and considers that the few simple rules laid down by the London electricity supply companies are a good working basis. Contractors will find his article of considerable practical value for, as REVIEW readers know, the author has not only had many years' contracting experience but can put the results of that experience into readable form.

More Cooling Towers

A REMARKABLE feature of the existing generating stations to be extended by recent directions of the Central Electricity Board, listed in this issue, is the large proportion that employs cooling towers. New plant to be installed by the winter of 1939 (apart from the new Dartford station) totals 400,000 kW and raises the value of plant approved during 1936 to £10,000,000. This includes eight towers with an aggregate capacity of 14½ million gallons. Performances put up by such stations as Brimsdown and Hams Hall indicate that the use of modern cooling towers does not necessarily preclude high thermal efficiency.

Lightning

THE physicists made most of the running at the Institution of Electrical Engineers during the discussion on Mr. B. L. Goodlet's paper, when it was evident that more than one view exists as to the mechanism of the lightning flash. Nevertheless the purely engineering aspect of the paper is a most important one, since lightning is responsible for by far the greatest number of overhead-line troubles with their accompanying risks to associated apparatus. The author's demonstration of the effects of artificial lightning left little room for doubt as to the preponderating part played by tower-footing resistance which we believe to have a bearing in quite 50 per cent. of overhead-line failures. Just over a year ago Mr. F. C. Winfield was looking forward to a solution of lightning problems on transmission lines within five years. It may be that engineers, working on clues of the kind provided in Mr. Goodlet's paper (one of the valuable features of which was that it raised as many questions as it answered) will work out their own solution, to a great extent empirically, providing material that will enable physicists to round off their theories to square with observed results.

Bus-bar Faults

RECENT breakdowns at large generating stations, at home and abroad, have emphasised that the problem has three aspects: initial cause, limitation of effect, and restoration of supply. The 33-kV bus-bar fault at Barking last week might well have had more far-reaching consequences, but supply was maintained except from the feeders connected to the section of the switch house involved, and was subsequently everywhere resumed by inter-connections on the outside system. The protective gear and fire-fighting equipment operated effectively, and the promptitude shown by the staff was a very necessary factor in the resumption of supplies. The deduction is that limitation of the trouble and a flexible network lay-out are quite as important as means for preventing faults, which may be of an unforeseeable character.

Switch Oil

THE hygroscopic nature of oil gives rise to more difficulties in switchgear than in transformer maintenance. The venting of circuit-breakers makes the oil more susceptible to dampness and acidity in the atmosphere, while no appreciable help is given by temperature rise under load in driving off moisture. That traces of moisture cannot be eliminated is implicit in B.S. Specification No. 148, which provides for a minimum breakdown voltage of 30 kV across a 4-mm. gap, less than half that which a perfectly dry oil would stand up to. As the dielectric strength declines very rapidly with the smallest occlusions of moisture, remaining steady after it has reached a point that may be dangerous if other impurities are present, it is not advisable to wait for the maximum wetness to become apparent. A correspondent stresses the need for periodic reconditioning, but while an oil after drying may give a good dielectric test, it has been suggested by Mr. J. Eccles in these columns that this may be due to the lower ionisation of concentrated as compared with dilute acid, indicating that caution is required in accepting such tests as final.

Thrift in Industry

IN the past we have made frequent references to the merits of the National Savings Movement as a means of encouraging employés to make provision against evil times. We are interested, therefore, to hear of a special effort which is now being made by the National Savings Committee to enlist the aid of employers in this matter. It is pointed out that while large industrial and commercial concerns are able to set up superannuation and provident schemes the resources of small employers are not big enough to allow them to follow this good example. For these the National Savings Movement offers an alternative which, while perhaps not so satisfactory, enables them to assist their employés to provide for their old age or for periods of ill-health or other misfortune. A variety of schemes has been drawn up and particulars of these are available on request from the Committee's headquarters, Sanctuary Buildings, London, S.W.1.

Black Tin

PARTICULARS of further investigations carried out by the International Tin Research Council, which initially resulted in the production of colourless films on tin, are given in a new technical publication (No. 48) of that body. Mr. D. S. Macnaughton (director of research) and Dr. R. Kerr have developed an anodic process of preparing black films without recourse to dyeing, which is necessary in order to colour the films previously obtained, as it is for those deposited on aluminium. The tin or tin alloy article forms an anode in a 90 deg. C. solution of sodium phosphate during a treatment that lasts six minutes for simple shapes. Current density is upwards of 30 A per sq. ft. and the film thickness about 0.0002 in. The surface is said to be unaffected by considerable deformation of the metal. Some plates included in the report, showing pewter so treated illustrate the possibilities of this further application of electricity to decorative purposes.

Mechanics for the Army

THE new War Office scheme for recruiting engineering tradesmen avoids the difficulty of securing suitable men that was inherent in the system previously in force. Formerly men accepted as fitters after the age of eighteen (provided they had had three years' workshop experience) generally had not completed a recognised apprenticeship, and this debarred them from acquiring skilled status on return to civil life. Under the new regulations a mechanic entering the R.E. or the R.A.O.C. must be between twenty-one and twenty-five years of age and have served his full time, so that he gains experience as a journeyman in the Army and is eligible for a craftsman's position on being transferred to the Reserve. Moreover, entrants are permitted to remain or become members of their trade unions. As the number required initially is only about 0.5 per cent. of the skilled men in the categories concerned, subsequent reabsorption in industry should present little difficulty.

20,000 Million kWh

MORE than 20,000 million kWh was generated by authorised undertakings in Great Britain during 1936, according to the returns of the Electricity Commissioners. This is an excellent record. The rate of expansion in recent years (per cent.) has been as follows:—1930, 5.6; 1931, 4.5; 1932, 7.1; 1933, 10.7; 1934, 14.0; 1935, 13.6; and 1936, 15.4, proving that not only is progress being made, but that the advance is gaining in momentum.

A Wonderful Opportunity. By H. T. Young

Big schemes worthy of a great occasion

THE experience that the electrical industry has gained in the last five years or so in lighting for festive occasions will be of enormous assistance in planning decorative lighting for the Coronation celebrations. We have still fresh in our minds the magnificent efforts put up in London, Edinburgh and various other parts of the country for the International Illumination Congress, the Faraday Centenary and the Jubilee of King George V, which showed in no uncertain manner, the appeal that this form of lighting makes to all classes and to persons of all ages.

[*Paul Tanqueray*

Mr. H. T. Young, President of the Institution of Electrical Engineers

The decoration and illumination for the Coronation is necessarily influenced by the character, not only of London itself, but of every city, town and village, with widely different atmospheres and problems. This nation has not yet adopted large scale planning of streets, with the result that its cities have very few of the grand avenues such as are found in Paris, Rome, or Moscow — made originally for triumphal marches and great displays of pagentry and which remain, even in their normal everyday state, vast and impressive. London, the focal point of the celebrations, has few such great vistas, and the type of Coronation decoration must vary considerably from district to district, and street to street, owing to the individual character that each possesses.

Unfortunately, few of our streets are designed as a whole, and to take two examples, Regent Street and Bond Street, with their conglomeration of individual essays in architectural design, no scheme could be uniform in such streets unless it completely ignored or obliterated the architecture, and the worst possible approach to such a problem would be to consider for one minute the floodlighting of individual buildings.

The shopkeepers of Bond Street have shown imagination by arranging a competition amongst architects for day and night decorations and illuminations. The designs submitted show long rows of banners, which look attractive and gay by day, and even more attractive and fascinating when floodlighted at night. (A model is on view at the Building Centre.)

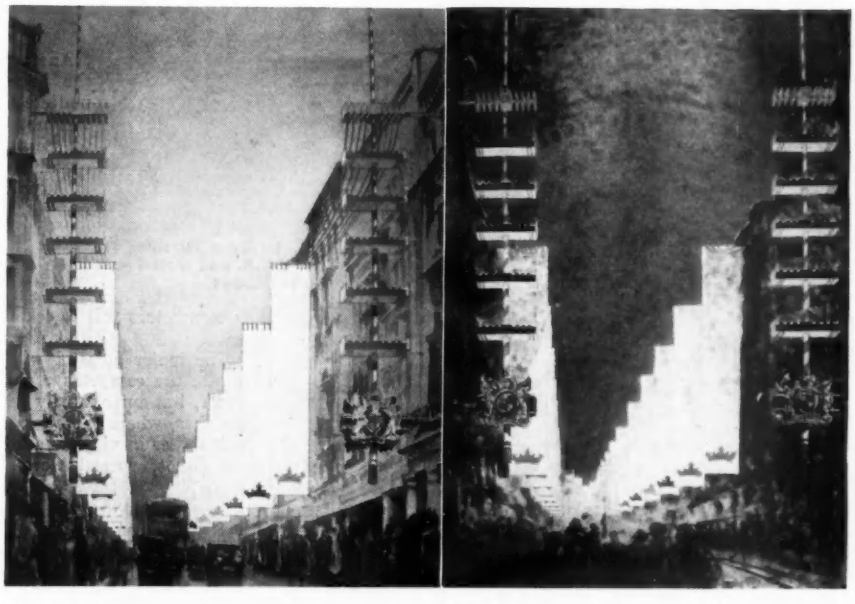
We have some grand opportunities—Parliament Square, Whitehall, The Mall, the parks, and every other town and city has its own possibilities. London's greatest possession is its river, with its great sweep from Lambeth to Blackfriars, and surely here is the opportunity—right in the heart of the capital of the Empire—to stage a magnificent river pageant. Tall standards at regular intervals, the whole length of the Embankment, with huge flags of Great Britain and the Empire, each fluttering in the beam of its own floodlight. How different this would be from the haphazard drapings of bunting and miserable little flags which we know so well. The bridges floodlighted from water level and carrying festoons of lights and flags above; and, anchored in the middle of the river, gaily decorated boats representative of the Port of London, the Merchant Service and the Navy, together with floodlighted flying boats representative of the very best that this country can produce. Surely, for such an occasion, gay motor-boats and river steamers could take thousands of visitors to the Metropolis to see the river itself, and London from the river.

How wonderful it would also be to have a range of illuminated fountains erected in Hyde Park, and how very commendable and delightful would it be if each town and city gave some form of electrically illuminated entertainment of this kind, particularly to the children, away from the crush of traffic centres. Most other countries know the value of beautiful fountains for open space decoration by day and by night, and may we hope the Coronation festivities will give some towns and cities in this country their opportunity.

We have learned from past experience to treat the floodlighting of buildings as an architectural problem, and not to make it merely an opportunity for obliterating architectural delicacy and detail in a blinding glare. Some of the older buildings would respond to kindly floodlighting in sympathy with their time-mellowed colour and weather-worn stone, and it would be ungracious to allow dazzling floodlighting to reveal all the imperfections of dignified old age, in stark unqualified clarity.

It is to be hoped that architects, carefully chosen for their sympathetic outlook and wide architectural knowledge, will be appointed in all important cities to co-operate with electrical engineers in order that the best possible results will be produced. Some buildings, when floodlighted, acquire a lightness and delicacy which they have never possessed under ordinary conditions, and even some of the architectural mistakes of our towns and cities, with the skilful placing of light or the quality of its colour, can have their ugliness dissolved and transformed into luminous beauty.

The Coronation should provide a grand opportunity of cleaning up buildings in all our cities, so that they shall present bright, clean faces which will look cheerful and gay, both by day and by night, and which will make floodlighting worth while. The standard of general arrangement, colour, detail and, most particularly, decoration by light, must be entrusted to those who together can correlate their ideas to make settings not only worthy of this wonderful occasion, but to demonstrate our ability to stage the Coronation of George VI in a magnificent way.



The winning design in a competition for the Coronation decoration of Bond Street, London, day and night views. Another design submitted is illustrated on page 103

Meter Testing in Germany

The German Government, according to Herr Hans Vogler in *E.T.Z.*, has recently passed a law rendering it compulsory for all electricity meters in use to be periodically tested. The author states that the new measure is creating many difficulties for supply undertakings, as may be realised from the fact that there are about 16 million such meters in use in the country, a number which is annually increasing at the rate of about one million. Thus, to carry out the tests on all meters within a period of five years four millions will have to be tested each year. The law provides that in the case of undertakings not provided with meter testing and standardising departments the work may be entrusted to those manufacturers of meters who are authorised to carry out such operations.

The Electrical Contractor's Part. By H. M. Drake, B.A.

No time to lose

IN view of the fact that comprehensive arrangements are now being made all over the country to celebrate the Coronation of King George in the traditional manner, it is to be hoped that members of the electrical installation trade will do their utmost to retain the bulk of this work and revenue in electrical hands. No other system of illumination can approach the diversity of design and display that electricity so easily provides. The main thing is to put the necessary drive into our early selling schemes, and to start that drive without the loss of further valuable time. Our main trouble will be occasioned by the last-minute rush; and the sooner we can provide for the larger decorative schemes that will be required by vast numbers of shops and business houses generally, the better shall we be able to deal with those inevitable last-minute demands which are the bane of all our lives.

In connection with the larger civic schemes involving the floodlighting of public buildings and the decoration of main thoroughfares, a word must be said concerning the illogical absurdity of expecting such work to be done for nothing. Experience of public illumination work in recent years has shown electrical contractors that endless work and attendant worry can be incurred if their services are given on a non-payment basis. I suggest that electrical contractors are no less patriotic or public spirited than any other section of the community, but exactly how such "public rejoicing by light" is to be handled except on a commercial basis is extremely difficult to see.

After all, the main item of installation and erection expense is represented by the wages of our operatives, and it is never suggested for a moment that the services of wiremen, not to mention those of the manufacturer, should be secured on a "love" basis. Why, therefore, should the contractor be asked to do work for nothing?

The vast majority of the larger public schemes are, of course, already arranged; but the electrical contractor is provided with a large potential field in selling comparatively imposing illumination fixtures for the use of the larger shops and business houses. There is no doubt that the general public is far more "light conscious" to-day than ever before, and no special selling effort will be called for in securing orders from large traders accustomed to reasonable expenditure under the heading of decorative advertising.

Another fruitful source of business is that which will be forthcoming from all types of hotels and from the owners of large blocks of residential flats, where the provision of floodlighting or decorative emblems can be recommended on the ground of attractive advertisement as well as on the score of public sentiment and loyalty to the Crown.

[Whitlock & Sons

Mr. H. M. Drake is President of the E.C.A. and Allied Associations

Showing the Goods

In the latter direction the trade is already aware of the fact that an excellent selection of decorative emblems at very moderate prices has been prepared by the leading electrical manufacturers, and every effort must be made to bring these designs to the personal notice of responsible business executives. In this matter, however, something more than miniature colour prints are required. The trade must be in a position to exhibit one or two actual designs which are representative of the equipment available, colour prints being used only to indicate the general appearance of alternative designs. Even for this purpose colour prints are insisted upon. Black-and-white photographic illustration is inadequate.

From the large shop or business house to the smaller shopkeeper is only a small step, but in the latter case the sales resistance will tend to be somewhat intensified, whilst the size and cost of the decorative emblems will have to be proportionately reduced.

This brings us to the private householder, from whom, I firmly believe, a very large volume of electrical decorative business will be obtained. The suggestion has already been made that the public might turn on all the front lights in their homes and leave their blinds or curtains undrawn during the Coronation festivities, but few will be satisfied with such a primitive arrangement. In this, as in a good many other directions, the competitive spirit among smaller householders will no doubt be in evidence.

Those who remember the Coronation of King George V will remember the extensive sale of glass "fairy lamps" by ironmongers and oil shops all over the country. These coloured well glasses were provided with night-light candles and were most extensively used for the decoration of small private houses. At the present day, however, the public will not be satisfied with such schemes as these, and the electrical trader who sets out to capture this business in his area will undoubtedly reap a very reasonable reward. In this market, also, the manufacturers are ready with simple and inexpensive devices and emblems calculated to meet a demand which, in the aggregate, will be well worth handling.

Again, going still further afield, the electrical contractor who is awake to the possibilities of the Coronation will not overlook the village hall or institute. Simple external decorative lighting, with internal devices of the lamp-shade variety, will be in strong demand. Here, again, it is necessary to "show the goods" if enthusiasm is to be roused and sales effected.

Get to Work at Once!

As I have already stated, time is the essence of the contract, for the general public, as a rule, have the impression that all their requirements grow conveniently on trees and that they only have to ring up at the last minute and say "Please send me some special Coronation illuminations" to obtain the full effect which they desire. Unfortunately, the trade has to put up with such methods, but much heart-burning will be saved if electrical contractors and others start immediately a campaign impressing upon the public that the equipment they desire has to be designed, manufactured, and distributed at an early date, and that the efforts of the trade will be greatly facilitated if people will make up their minds what they require and order the necessary temporary wiring. How can manufacturers be expected to assess the scale upon which they propose to manufacture such special equipment unless contractors will assist them by approaching the public at the earliest possible moment, with a view to gauging the extent of the market?

Another important point which bears on the necessity for quick action is that, if matters are left until the last moment, there will not be enough wiremen in the country to see that the temporary installations are sound and safe. The lazy Englishman who, as usual, has left everything to the last minute, and has found that no contractor can help him, will set to work and, with the aid of a few nails and some wireless flexible, will botch up a death-trap of which he will be inordinately proud. All this can be avoided if contractors will attack the matter in a proper way, and at once.

The major demand will arise in large towns and suburbs, where the competitive spirit will have a natural stimulating effect, but undoubtedly a demand can be created in country districts, where there are bound to be celebrations of one sort or another in village halls, and even in private houses, where, no doubt, special Coronation dances and parties will be given.

In any case, a large quantity of work will be done by somebody. If that work is done at once it will be done through contractors. If it is left, much of it will be done inefficiently and dangerously by the individual, and it is surely up to the industry as a whole, and contractors in particular, to see that the celebrations in May are really worthy of a very great occasion.

Skilled Mechanics for the Army

The War Office has inaugurated a new scheme of recruiting fitters, turners (R.A.O.C. only), electricians, and instrument mechanics. One thousand unmarried men between the ages of twenty-one and twenty-five years who have completed an apprenticeship are required by March 31st, 1937. They will serve six years with the colours and six on the Reserve for the Royal Engineers and three years with the colours and nine on the Reserve for the Royal Army Ordnance Corps. Large engineering firms have promised to facilitate enlistment and to consider favourably applications for re-employment on conclusion of colour service, and the men can remain members of or can join their Trade Unions while serving. Opportunities will occur for men to make the Army a career and reach the higher ranks. Pay will be from 22s. 9d. to 35s. per week, with food, accommodation and clothing normally applicable to Army tradesmen, and men will be granted pay during holiday periods (normally twenty-eight days per annum) together with a daily ration allowance of 1s. 11d. Reserve pay will be 5s. 3d. per week.

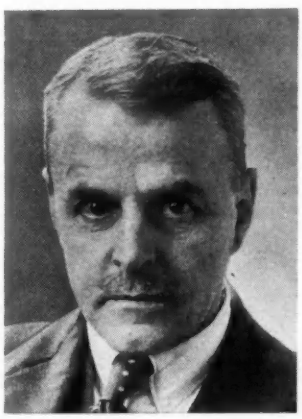
Installing Illuminations. By H. R. Taunton

A few points to be borne in mind

CORONATION illumination work is rare in the experience of most of us. It differs in no way, however, from work for any temporary illumination—except that it is of unusual importance. No contractor can afford to risk any failure in what he undertakes on so unique an occasion. He will have no time to rectify any defect in his work; it will have to stand or fall by its showing on, practically, a single night. If, when that night comes, his scheme of illumination fails to justify the money which his customer, vying in loyal display, has put up for it; if it doesn't light up, or it breaks down, or its effect is ruined by even a partial "black-out," be sure he will never be forgiven. There will inevitably be failures, great or small. Each will mean to the contractor concerned not only loss of money but permanent loss of goodwill and prestige.

Because the occasion is so important, because failure to rise to it is so irremediable, it behoves every contractor to ensure success by avoiding shoddy material, by employing skilled labour, and above all, by strict adherence to the commonsense rules governing temporary electrical work. It may curtail his profits to vanishing point—though there is no reason why it should—but better that than a bitterly disappointed customer. And the sort of customer who will be placing worthwhile illumination contracts is the sort of customer a contractor can't afford to disappoint.

After all, given good material and careful workmanship, there should be no excuse for failure. The rules governing such work as is required are no more than familiar rule-of-thumb and commonsense. The gist of the matter is in Section 5 of the I.E.E. Wiring Rules—"Temporary Installations"—particularly in Rule 501. In this particular case, of Coronation illumination work, only that part of the rule is applicable which reads: "Special care shall be taken to ensure that the installation is in accordance with the special requirements of the insurance company, supply undertaking, and local authority concerned." In effect, that means, in all but exceptional cases, that the installation need only satisfy the supply undertaking to satisfy everybody.



[*Elec. Rev. photo.*
Mr. H. R. Taunton, A.M.I.E.E.

London Regulations

For electrical work for the coming Coronation the London supply authorities have agreed on a uniform code of special regulations, and intending contractors will naturally make themselves acquainted with it. Regulations in the provinces will necessarily be much on the same lines, and it will be sufficient if here we discuss only the London code. It is simple—it is intended only as a supplement to ordinary wiring rules—and consists of no more than six clauses (or seven, if we include that dealing with the proposed charges: ¾d. per B.O.T. unit where there is no two-part tariff, subject to a minimum of 10s. 6d.).

The first rule is that the lamps of the intended scheme shall not be used for illuminating the interior of a building—obviously reasonable. The second is that circuits and fittings must be weatherproof and suitably protected by fuses and switches fixed inside the premises. This is no more than the first half of I.E.E. Rule 502. The third special rule stipulates that connection will only be made by the supply company subject to (a) the adequacy of its service at the point of supply and (b) a satisfactory test. It concludes with a reminder that notification of, and approval by, the fire insurance company concerned is necessary.

On the point of adequate service, compare I.E.E. Rule 3: "An addition, temporary . . . . shall not be made to . . . . an existing installation [unless] the current-carrying capacity and the condition of the existing accessories, conductors, switchgear, &c., affected are adequate for the increased load." This refers to the consumer's side of the service, and is as important as the supply companies' special regulation, which is only concerned with their side of it. Moreover, the I.E.E. Rule calls attention not only to the current-carrying capacity but to the "condition" of all wiring and gear. Ordinary tests should be supplemented by careful visual inspection. Any latent defects—surface leakages, bad contacts, worn fuses—will surely lead to inconvenient breakdowns under the greatly increased loads of the nights of illumination.

The regulation says nothing as to what will be considered a satisfactory figure in the prescribed (insulation) test. Presumably the high standards of Section 11 of the I.E.E. Rules will not be rigidly enforced—despite Rule 507—though the companies, treating the illumination scheme as a separate entity, may reasonably ask for the minimum given in Rule 1104—"1 megohm for the whole installation." Certainly it is to the contractor's own interest to secure the highest figure possible. The next two special regulations provide that the consumer pays the cost of any extra work necessitated by the inadequacy of the company's service, and that he gives due notice of his requirements for connection and disconnection. The sixth and last regulation is to the effect that connection is to be made on the company's side of any ordinary meter, or from a common main where large enough—the owner's consent being obtained—or from a temporary service; and the consumer's temporary circuit is to be carried to a point agreed with the company.

Apart from a reference to the companies' general conditions of supply—which must still be observed—that is the end of their special requirements. For the rest, the contractor must be guided by his standard practice. Though the rigid observance of all the I.E.E. Rules may be out of the question, he will not, for instance, connect his controlling switches to the "black" wire. Certain of the rules, however, are worth special attention.

The Loading of Circuits

There are three pertinent rules governing the maximum load of a final sub-circuit such as will be common in the illuminations. Rule 201D allows any number of holders on such a circuit (grouped holders) with a total loading up to 10 A, and Rule 801F repeats it, with particular application to signs, and by its wording seems to withdraw even the limits given in the former rule. On the other hand, both rules apply to permanent work; whereas Rule 503, for temporary work, states explicitly that the total load in such a circuit shall not exceed 1,000 W. It would be useful to have an authoritative ruling from the companies whether they wish contractors to follow the rule for temporary work or will allow them the wider limits of the rules for permanent work.

For the installation of the conductors and cables (Section 4 of the rules) Rule 403, dealing with exposed or cleated wiring, will be mainly applicable. The requirements of Clause C (that they shall be supported on effective insulators) will presumably be sufficiently met by their being mounted on the wood battens commonly used for temporary illumination work. Rule 505 of Section 5 should also be read in this connection. Note that metal-sheathed cables should not be used.

Rule 504 of the same section should be noted. It calls for a competent person to take charge of any temporary installation and accept responsibility for its installation and use. The only other rule in this section not already referred to is 506, dealing with flex. The significant words in it are: "Shall be used only where essential." If flex is unavoidable it must be either c.t.s. or braided and compounded. In view of the cheap material with which the market is sure to be flooded, Rule 602B is perhaps worth mentioning. It prohibits the use of celluloid anywhere near a lamp.

Section 8, dealing with electric signs and luminous-discharge tubes, should be followed as closely as possible. Neon tubes are incorporated in many of the devices offered, and these are generally complete with enclosed transformers, ready for direct connection to the supply voltage. Will the authorities insist on the observance of such rules as 808, which requires the provision of a fireman's switch? Rule 1001D—earthing—is another to be borne in mind.

Guarding Against Fire Risk

An exceptional risk not covered by any existing regulation, and one which will have to be guarded against, is that from the flags, bunting, and other drapery which will be mixed with the electrical devices, forming, indeed, an integral part of many of the elaborate trophies already on the market. A large banner flapping loose in a high wind may easily create havoc in a neighbouring cluster of lamps; and rain-soaked fabrics blown against electrical metal-work may as easily cause disaster.

We all hope there will be neither high wind nor rain on the great day and night, but we can take no chances with our interesting climate. In England, in May—or in any other month, for the matter of that—external decorations and illuminations need protection as much from the whims of the weather as from electrical or fire risks.

Floodlighting and Illuminations

By W. J. Jones, M.Sc., M.I.E.E.

50,000 kW was switched on for the Jubilee celebrations

BASED on returns from supply engineers all over the country, it was estimated that 50,000 kW was switched on for floodlighting and illuminations in connection with the Jubilee celebrations in 1935. In some districts the Jubilee celebrations were the beginning of festive lighting to be kept on for the whole of the season, and in many seaside and health resorts the floodlighting and illuminations were augmented for the 1936 lighting season. We have thus seen the popularisation of floodlighting and illuminations during the last decade. In all probability as a nation we have gone in for illuminations more extensively than any other in Europe, and possibly more widely than in the United States.

We have, then, for the Coronation this background of permanent and semi-permanent floodlighting and illuminations, but it is already evident that the public at large is expecting much greater things. Councils are already making financial allocations; business houses will be considering lighting arrangements during February to April; and there are indications that street associations all over the country are making their own local plans for this festive occasion. The electrical industry is interested in two ways: manufacturers and contractors will be called upon to supply equipment and wiring, while the supply undertakings will reap not only an immediate reward, but can look forward to increased permanent use of lighting of this character.

[*Elec. Rev. photo.*

Mr. W. J. Jones, M.Sc., M.I.E.E., is manager of the E.L.M.A. Lighting Service Bureau

Our national architectural treasures come to mind as subjects for floodlighting; then, too, there are our civic centres—the more modern as at Cardiff, Swansea, and Southampton being ideal subjects for straightforward floodlighting. Many of the older civic buildings in the country are more difficult to deal with on account of architectural pretensions, or because the buildings faces themselves are grimy and difficult to liven up. For these reasons some would have them left alone, as they are better in the dark, but such people are expressing their own views and not those of the masses. It is a time of national rejoicing, and the populace expects its town halls and local churches to be the centres of Coronation celebrations, and the electrical industry must use every ingenuity to find satisfactory means for lighting up these more difficult subjects. As was the case with the Bradford Town Hall, which was lighted in 1935 (a difficult subject to handle skilfully, bearing in mind all the circumstances), designers need not rely on floodlighting alone; other forms of lighting can be used to give relief, contrast, and colour.

Entrance to Public Gardens, Plymouth, outlined in architectural lamps on a simple wooden framework

Britannia House, Bradford—a good example of a floodlighted commercial building

The colour rendering from mercury-discharge lamps is particularly effective on some of the dark grey buildings, while the neon discharge gives life to red brick buildings, so common in the Midlands and the North. Electric discharge lighting, with its wide range of colours, producing from two to five times more coloured light for a given consumption than would be possible from tungsten filament lamps, has placed colour floodlighting on the map.

It is unwise to paint the town red, green or blue just because these new light sources are available. Far better introduce colour as a contrast feature, or retain its solo use where it is particularly effective. The table gives the approximate wattages necessary to floodlight 1,000 sq. ft. of a light coloured surface, or of a surface with approximately the same colour as the light :—

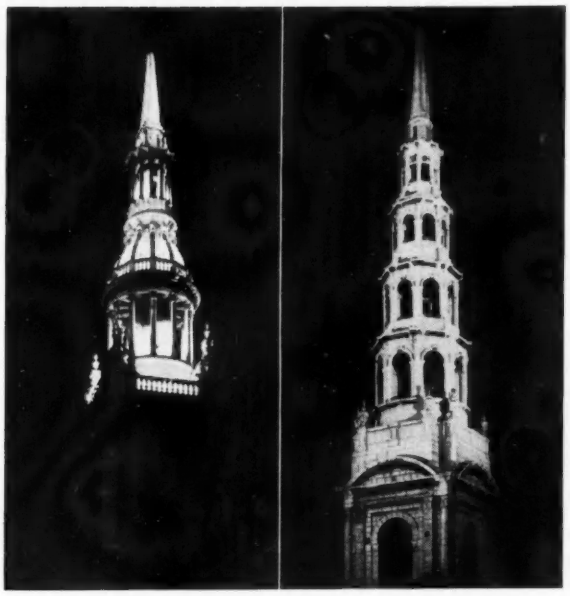
APPROXIMATE WATTAGES NECESSARY TO COVER 1,000 SQ. FT. OF CLEAN PORTLAND CEMENT.

Lamp Type.	Colour.	District Brightness.		
		Low.	Medium.	High.
High-pressure mercury	Greeny-blue	250	400	650
Low-pressure mercury	Green	750	1,250	2,000
Low-pressure mercury	Blue	750	1,250	2,000
Neon...	Red	950	1,600	2,500
Sodium	Yellow	250	400	650
Tungsten filament	White	600	1,000	1,600

Recent international exhibitions have afforded excellent opportunities for experiment. The exhibition at Brussels in 1935 showed us how effective trees and foliage become when lighted with a skilful blending of tungsten, sodium and mercury lamps. Cannot we expect to see some of our avenues lighted (and incidentally put much of the existing street light-

ing to shame)? In parks, mercury lamps should be used for the lighting of lawns and leaves, but a few tungsten lamps should be introduced near the beds of coloured flowers so that they may show up in truer colour, as was done by Cheltenham undertaking in September last.

One of the most successful lighting schemes of the Jubilee celebrations was that devised by Maitland for the International Communications building. It was not possible to floodlight the building as a whole for various reasons, so panels of painted plywood were placed on the front of the building to form a symmetrical pattern. By day these panels provided a bold and attractive decorative scheme, and at night sections of the panels were floodlighted locally to form a most attractive illumination scheme. Yet another successful scheme was the outlining of India House with architectural lamps.

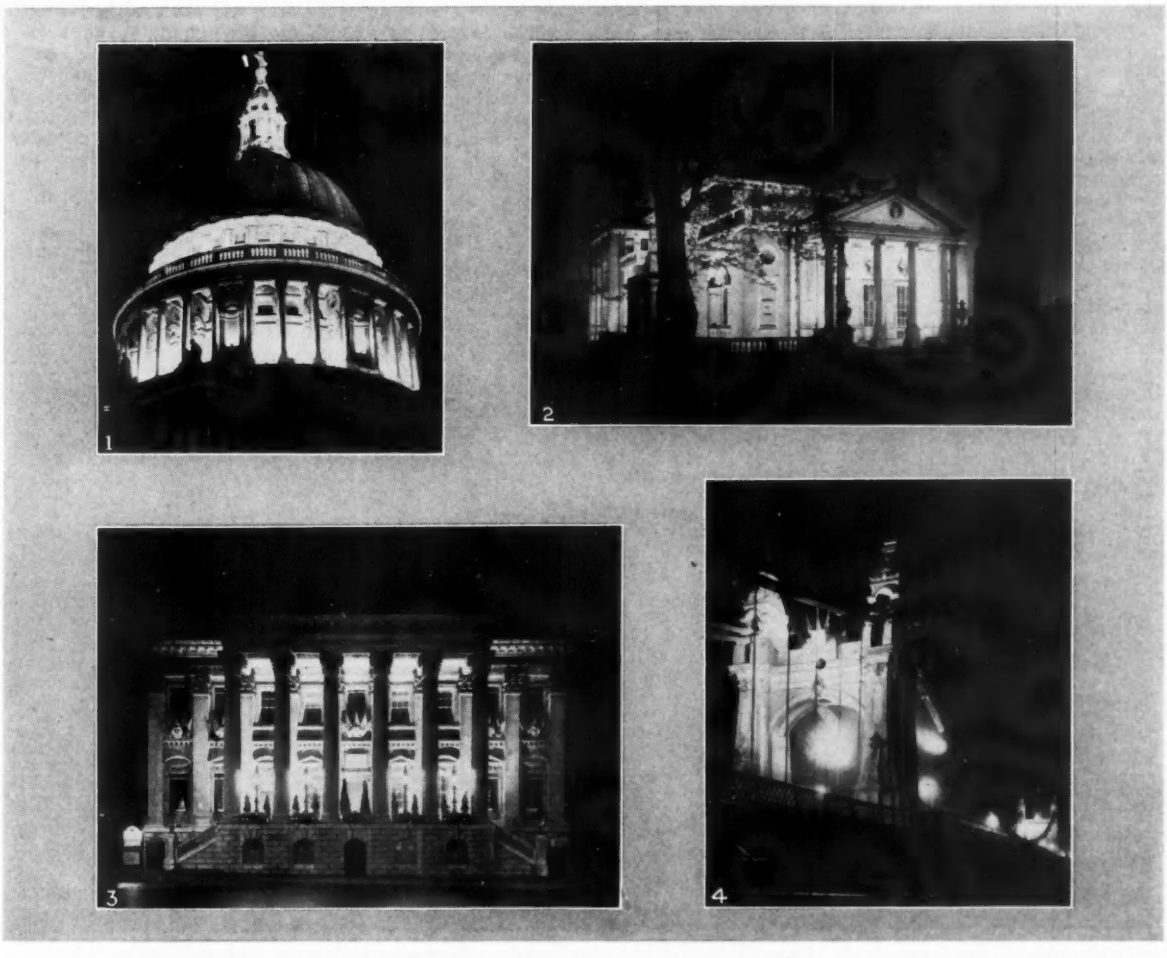


Left: Bow Church lighted from a distance with supplementary local lighting, the sense of perspective being retained. Right: In contrast: St. Bride's Church lighted only from a distance

Again, exhibitions provide us with many suggestions for creating subjects for festival lighting. Made in composition board, many designs may be worked up which prove amazingly attractive when illuminated. For instance, pylons can be built up on four curved reflecting surfaces. Down the middle of each a narrow trough may contain 25-W lamps. The capital feature of the column might well consist of architectural lamps, while the tops reflect coloured light from lamps immediately below. For the purpose of the Coronation such a pylon as this could readily be adapted to have appropriate cut-out letters suspended from the periphery of the concave cone.

The more ambitious modern lighting schemes associated with floodlighting and illuminations have tended to crowd out the small efforts of individuals in providing their own illuminations for such festive occasions. The greater availability of electricity throughout the country should enable the electrical industry to devise simple means for providing such illuminations electrically. We should, therefore, encourage the use of decoration lamps for outlining the inside of windows, or, where a little more money is available, the installation of striplight along the eaves of the buildings.

In order to obtain the maximum from these Coronation illuminations, supply engineers and contractors must foster every movement in connection with the celebrations. They should be prepared to sponsor ideas which can be adopted by a street of traders or offer their services to any committee set up to deal with Coronation celebrations, and be prepared to submit ideas on lighting free of charge. There is bound to be much scrambling to install illuminations for May next, and while everyone in the electrical industry will undoubtedly be busy, only those who have fostered the movement on an organised basis will reap the maximum reward. Others will find it too late to obtain appropriations, too late for satisfactory negotiations, and too late to obtain supplies.



Applications of floodlighting during the 1935 Jubilee Celebrations: 1. St. Paul's Cathedral. 2. Northmet House, Southgate. 3. The Mansion House. 4. Hammersmith Bridge

Plans for the Coronation Festivities

Facilities offered by electricity supply authorities and schemes already in hand for the decoration and illumination of streets, parks and public buildings

BEFORE people come to a decision to purchase extra illumination equipment they will wish to know at what rate they can obtain electricity for the purpose. In many centres special arrangements have been made to allow the consumer to have electricity at low rates ranging from 1d. per kWh downwards. Many authorities have even agreed to supply electricity free of charge. These include Aldershot, Bacup, Bedford, Blackburn, Bolton, Cheltenham, Crewe, Guildford, Leyton, Manchester, Norwich, Rochdale, Rotherham, Rugby, Salford, Stretford Board, Wallasey, Walton and Weybridge, and West Bromwich. In most cases the period will be for one week from May 11th to 17th, although in certain cases a fortnight is allowed.

Night view of a fountain and cascade at Southsea Winter Gardens

Connection fees will be charged in some instances, and these are generally between 5s. and 10s. Certain of the larger industrial towns will restrict the use to after 6 p.m. At Bradford and Shipley only ½d. per kWh is to be charged, while the most popular charge appears to be ¼d. per kWh; in these cases the rates frequently apply to the whole of May. A few towns are to charge 1d. per kWh to private consumers, although lower rates will generally be available where the work is under the direction of the municipality. Supply companies, too, will generally give specially favourable terms to the municipalities.

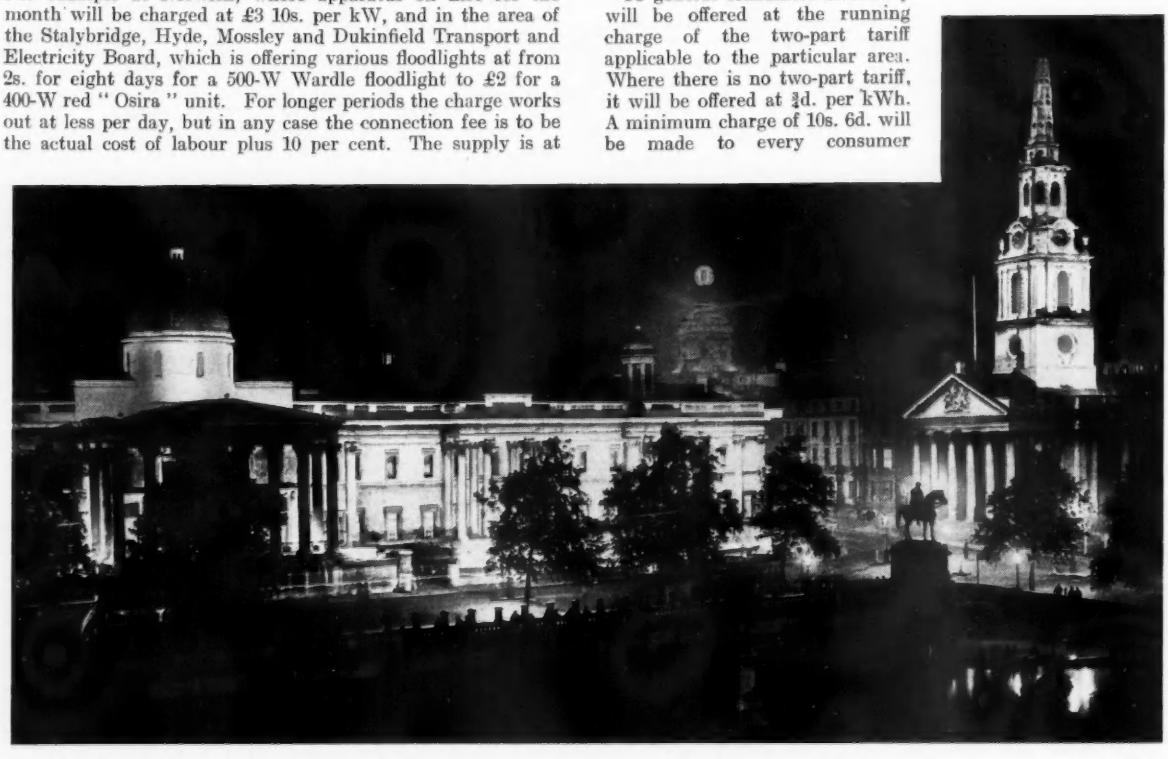
So far we have seen little evidence of the supply authorities providing material on hire—possibly the short duration of the celebrations has influenced this, although there are exceptions. For example at Norwich, where apparatus on hire for the month will be charged at £3 10s. per kW, and in the area of the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board, which is offering various floodlights at from 2s. for eight days for a 500-W Wardle floodlight to £2 for a 400-W red "Osira" unit. For longer periods the charge works out at less per day, but in any case the connection fee is to be the actual cost of labour plus 10 per cent. The supply is at 1d. per kWh after 5.45 p.m. Bradford will also offer equipment (floodlights at 5s. first week and 1s. subsequently) on hire, and strip-lighting will be obtainable at both Shipley and Bradford, the charge at Bradford being 4d. for the first week per set and 1d. thereafter, with reductions in these charges for large quantities.

At Eastbourne, in an attempt to brighten the town throughout the summer, a special rate of 2d. per kWh is to apply until September, ¾d. per kWh being charged during Coronation week. At Chester, however, where 300 business premises are permanently wired for illuminations during the spring and autumn, only ½d. per kWh will be charged. At York block power rates will be in force, ranging from 0.9d. to 1½d. per kWh; at Stoke-on-Trent the excess consumption over that of the corresponding quarter of the previous year will be charged at 1d. per kWh. A nominal fee of 5s. is all that Stockport traders will be asked to pay, while Sheffield residents will be charged at the heating rate of from ¾d. to 1d. per kWh. In another Yorkshire city, Leeds electricity will be provided free, apart from a fee of 2s. 6d. per kW installed.

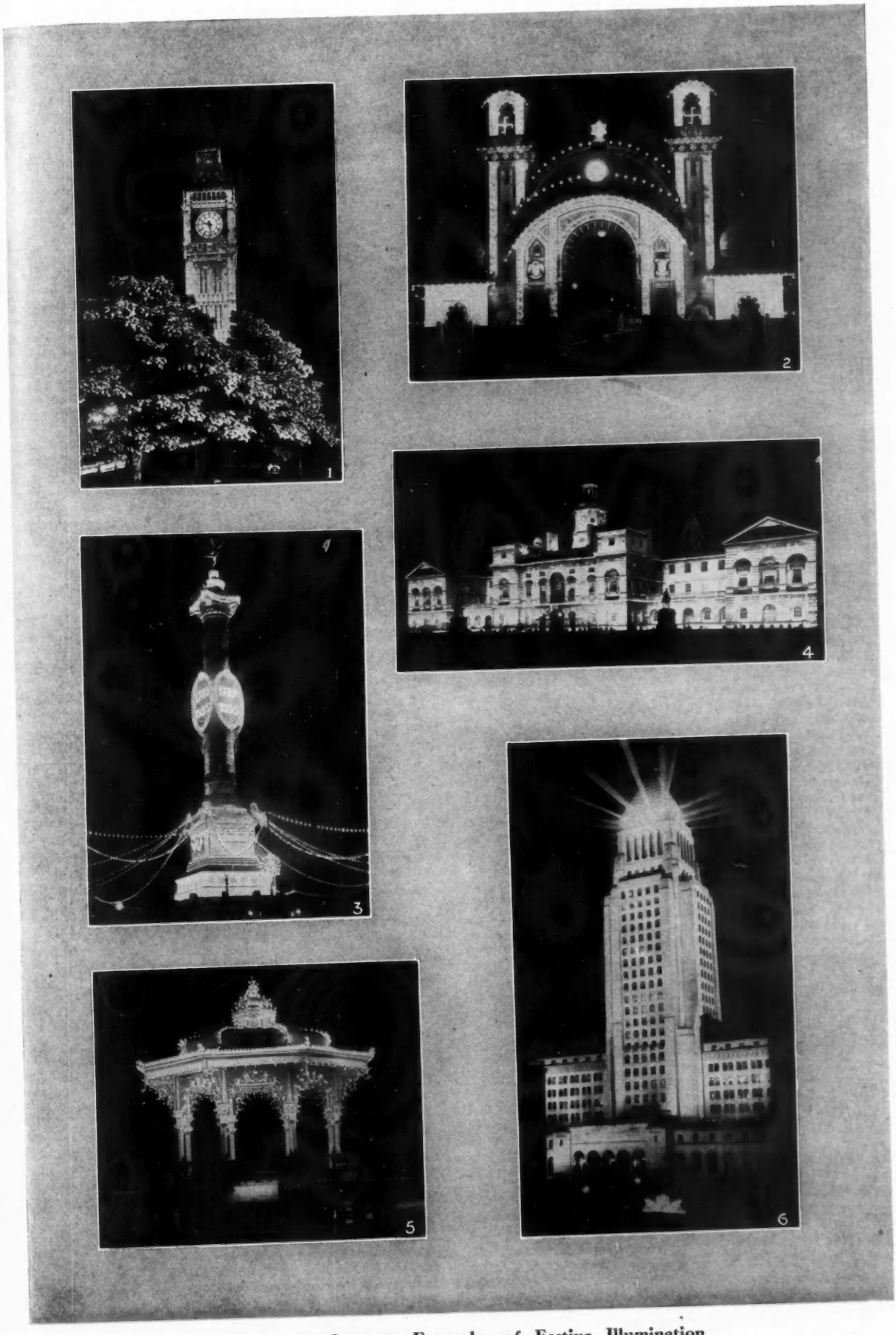
London Arrangements

In the London suburbs as a whole plans have hardly crystallised yet, although ½d. per kWh will be charged by the North-Met. Co., and Ealing and Croydon and Poplar will provide supplies free of charge. The London supply companies will offer a supply to municipal authorities free of charge for the purposes of floodlighting or externally illuminating municipal buildings. The work involved in testing, connecting and disconnecting the services will also be carried out free of charge.

To general consumers electricity will be offered at the running charge of the two-part tariff applicable to the particular area. Where there is no two-part tariff, it will be offered at ¾d. per kWh. A minimum charge of 10s. 6d. will be made to every consumer



The illumination of Trafalgar Square during the Faraday Centenary celebrations, showing the treatment of the National Gallery and St. Martin's-in-the-Fields



Home and Overseas Examples of Festive Illumination

1. The Clock Tower of the Houses of Parliament. 2. The Maharajah of Baroda's palace illuminated for his Diamond Jubilee Celebrations. 3. Illuminations to celebrate the 146th anniversary of the fall of the Bastille, Paris. 4. The Horse Guards floodlighted. 5. Brighton bandstand outlined with striplight. 6. The City Hall, Los Angeles, U.S.A., illuminated to mark the first transmission of Boulder Dam power

accepting this offer, but this charge will cover the use of the meter and include the cost incurred by the company in testing, connecting and disconnecting the installations.

One influence on the preparation work, to make a comparison with the Jubilee activities, is the change of outlook of some manufacturers as the result of the general improvement in national conditions. Whereas in 1935 there was eagerness to find any business to fill empty benches, in some cases now the manufacturers are loath to take on extra contracts at a time when they are finding it difficult to meet normal business demands. Accordingly, it is essential that manufacturers should receive every assistance by way of early ordering.

An excellent example of festoon lighting and illuminated flower beds at Morecambe

Strong feelings are held on the advisability of collective action to obtain harmony throughout nearby illumination schemes. London will take the lead, of course, and many public buildings will be illuminated. Mr. Sizer, of the Office of Works, tells us that the principal buildings and structures to be floodlighted under the auspices of his Department are Buckingham Palace, the Queen Victoria Memorial, St. James's Palace, the Horse Guards, the Admiralty Arch, the National Gallery, the Clock Tower of the Houses of Parliament, Somerset House, the Royal Naval College (Greenwich), the Tower of London, the Round Tower (Windsor), St. George's Chapel (Windsor), and Hampton Court Palace. All the schemes are likely to be similar to those employed for the Jubilee celebrations.

We would like to see more examples of general illumination such as was arranged in Trafalgar Square for the Faraday Centenary celebrations. St. Martin's portico was illuminated by 1,000-W 25 deg. beam angle floods, mounted on the roof of the National Gallery, while the tower was similarly illuminated, with the addition of 1,000-W 54 deg. beam angle floods situated on the church roof itself. The spire was lighted by 1,000-W 11 deg. focus floods. The main front of the National Gallery was floodlighted by 1,000-W wide-range floods in the forecourt, while for the interior 500-W wide-angle floods were used. The dome was picked out by 500-W wide-angle floods on the roof of the portico. The Nelson column was lit by 1,000-W spotlights incorporating the "Stelmar" optical system, three of these lanterns being mounted on the surrounding buildings with very long throws—in one case about 35 ft. Strand Electric Co. projectors were used.

For the lighting of the Clock Tower of the Houses of Parliament for the Jubilee 120 Siemens "Monarch" projectors of the long-range narrow beam type were used with 1,000-W lamps. Mr. W. T. Curtis, architect for the Middlesex County Council, says that the floodlighting of the Guildhall will depend upon the stands which are contemplated against the façade of the building. Probably the tower and the main entrance of the Guildhall will be the only parts that it will be practicable to floodlight.

Illuminating Historic Buildings

Next in importance, we should say, to the great Government and public buildings as subjects for floodlighting are old historic buildings and such structures as old town walls. Special illuminations are being carried out by the Norwich supply undertaking for the following historic buildings: The remaining embattled keep of the fine old Norman castle, situated on a mound in the centre of the city; the 15th century Guildhall, a flint and freestone structure with embattled parapets; and the architecturally beautiful Erpingham and St. Ethelbert entrance gates of the Cathedral Close. At York it is proposed to floodlight the Guildhall from the river, parts of the city walls, the war memorials, and Clifford's Tower.

Expenditure has been recommended by the Southampton Electricity Committee for floodlighting and decoratively illuminating the three Civic Centre façades, the Bargate and parts of the old town walls—from Arundel Tower to just beyond Forty Steps and the arcaded portion opposite the New Docks entrance. It is good to hear of co-operation between the authorities and private concerns. Mr. Yeaman (Stoke-on-Trent) says that schemes are to be arranged jointly with traders of the Five Towns, while the Illuminations Committee at Leicester is negotiating with the owners of about thirty private buildings.

The popular striplight will be much in evidence; at Southend, Brighton, Blackpool, Hastings, and other seaside resorts there will be a good deal of street illuminations by this means. Mr. G. H. Oldroyd, borough electrical engineer of Stockport, has undertaken to festoon the main Willington Road from Mersey Square to the Town Hall, and festooning with striplight between tramway poles will be carried out at West Bromwich. Hull will illuminate the two principal traffic entrances to the city, *i.e.*, the main Boothferry Road and Beverley High Road. We hope that many will follow the lead of the City of Westminster, where certain items of the street decorations, in a few positions in the centre of the road, will be floodlighted.

Parks and gardens deserve really serious attention. There is no longer any need to convert gardens and lawns into so many square yards of "star flickering" earth, says Mr. Sully, as light-varying intensities and colours can be produced from hidden sources and directed on to the flowers, foliage and trees with exceptionally pleasing effects. The lighting of the flower beds at De Montfort Hall, Leicester, on the occasion of the British Association meeting in that town, was one of the finest examples of such work we have seen. Each bed was lighted separately by local units in order to afford a striking contrast with the floodlighting of the nearby building.

Because of the existence of plants of larger growth, such as standard roses, it was fairly easy to arrange for the inconspicuous suspension of the lighting unit. Each unit consisted of a 500-W "Mazda Vite" lamp with a daylight blue bulb in a metal reflector.

Mr. F. H. Rudd, engineer and manager, Rochdale, tells us that special treatment will be given to the very old well and gardens near the Parish Church. We hope and believe there will be many illuminated fountains about the country; Leicester and Wolverhampton will have something to show in this way.

Excellent effects can be obtained by suitable illuminations on, from or near a river or lake. Mr. S. E. Britton says that at Chester they will concentrate their energies on the illumination of the River Dee and the gardens and houses on the banks of the river. At Derby they are arranging for special illuminations for the various parks, including illuminated boats on the lakes. Floodlighting the Archbishop's Palace on both the land and the river sides and decoratively lighting the Medway Bridge are two pieces of work at Maidstone, Mr. Hoadley tells us. At Hastings trees on the islands in the two ponds at Alexandra Park will be floodlighted, as will the trees lining the banks of the stream. Many flower beds will be served by special units and striplighting.

Riverside commercial buildings, too, offer excellent facilities for effect, and we have in mind the floodlighting of Hays Wharf, London, for the Jubilee celebrations. Kandem long-range projectors were used for this work. The projectors were mounted on the loading jetties, nine on the left at a distance of about 30 ft. from the building, and four on the right about 60 ft. away. The latter were mounted on a temporary framework to obviate obstructing the jetty deck.

Coronation Illumination Equipment

What manufacturers have to offer

Now that Christmas and the uncertainties of the preceding few weeks are over, and less than four months remains to the Coronation, no time must now be lost if the illuminations are to be worthy of the occasion and if purchasers wish to be sure of having their equipment delivered in good time. While this is true to a certain extent even for the private individual or shopkeeper who proposes to buy perhaps a few yards of strip lighting or a single illuminated device, it applies particularly to the more ambitious municipal and joint schemes where negotiations are necessarily protracted.

IN many instances expenditure on illuminations has already been approved by the authorities concerned and orders are being held up only because of lack of knowledge of the equipment that will be available. It is therefore because we feel that prospective purchasers will wish to know at the earliest possible moment how they can best spend their money that we have decided to lay all the information at our disposal before them now.

It can be said that the abdication of King Edward VIII has been received by manufacturers with admirable calmness and they have set about immediately to make the necessary alterations to their schemes. These in most cases are slight and will interfere very little with the production plans already laid down.

Attractive devices by Siemens (left) and B.T.H.

Makers of floodlighting and general illumination equipment and accessories are practically unaffected, while most of the special Coronation devices already prepared will be readily adapted. The most serious alterations necessitated are naturally those in displays incorporating the King's portrait, but here, too, manufacturers have displayed their energy and resourcefulness, and some already have their new products on the market.

Apart from the enterprising displays planned in London and other large cities and towns, a very large proportion of the illuminations will without doubt be carried out in holiday resorts. Consequently, the choice of date of the Coronation is a particularly happy one, since the equipment may continue to be of service throughout the summer season.

It will be noticed that we have so far used the term "Coronation illuminations" to convey the idea of floodlighting, striplighting, special display pieces and other forms of decorative lighting. This appears inevitable, but the fact must not be overlooked that the occasion provides that extra incentive which, on account of the increased trade likely to result, will induce many business organisations and private traders to overhaul and improve their lighting installations. Especially is this true of shopkeepers, who are becoming increasingly aware of the advantages of well-lighted windows and show cases.

There is, too, another large class of prospective purchasers of illumination equipment among hotel and restaurant proprietors who will probably wish to make their premises more comfortable and attractive by incorporating one of the many pleasing modern decorative lighting schemes now available. Enterprising lighting fitting manufacturers, Harcourts, Ltd., for one, have already circularised many thousands of likely customers, suggesting improvements in their lighting. Is there not a possibility, too, that factories, offices and private households may follow suit?

However that may be, there is bound to be a much larger sale of special illuminated signs and devices than during the Jubilee celebrations of George V, when some manufacturers were more or less unprepared for the deluge of last-minute orders. It is with these special display pieces, therefore, that we will deal first of all, leaving floodlighting equipment, &c., till later.

Special Display Pieces

Several types have already been mentioned in our November 13th issue, and all these are, or very soon will be, available in their amended designs. The Astralite illuminated "Loyal Greeting" ply-wood set-piece now has shields and "G" and "E" and Union Jack designs, one on each side of a centre crown, with the words "A Health unto Their Majesties" below. Another low-priced, yet effective design by the same company incorporates silhouettes of the King and Queen in gold on a purple background with Union Jacks.

Apart from changing "E's" into "G's" there will be few alterations necessary in the G.E.C.'s special display pieces, the range of which, both in number and quality, is quite up to the company's customary high standard. So far as possible all apparatus is weatherproof and fire-resisting, and for most part is constructed of papier mâché and metal. Most of the more elaborate designs (in the £30 and £60 range), which utilise either "Osram" lamps or "Claudgen" neon tubes, are arranged for use in conjunction with flags and banners. For those with less money to spend there is a good selection of not quite so ambitious designs, Royal monograms, illuminated banners, etc., at prices as low as 10s. 6d.

A low-priced yet effective Astralite set-piece in ply-wood

The attention of municipal authorities in particular is drawn to special lines of floral festoons, illuminated banners and decorative lanterns, suitable for the decoration of streets, squares, public gardens, etc. Attractive prices can be quoted for these, as well as for the design and manufacture of special

decorative features or for carrying out complete schemes. Stock devices may also be supplied in alternative colours, sizes, etc., at a small extra cost.

Window boxes are other G.E.C. products for which there is likely to be a big demand, and we are particularly attracted by the range of garden illumination devices which are available from 12s. 6d. upwards. For interior use there are easily installed decoration outfits, artificial flowers and leaves and illuminated glass Union Jack shields.

A real effort to break away from too strictly conventional designs has been made by a number of manufacturers, and the B.T.H. Co., Ltd., in particular is to be congratulated on producing something "just a little different." This company's combinations of flags, spears, shields, crowns, monograms and tassels are especially attractive, while the simpler banners, crowns, festoons, floral designs, etc., are equally colourful and arresting.

All the B.T.H. devices are of robust construction and weatherproof, and they are well finished in attractive and durable colours. Special care has been taken in the arrangement of the lighting effects, and in many cases pleasing relief designs are achieved by the employment of indirect lighting, etc. For outlining "Mazda" pigmy sign lamps are generally used.

A Strand illuminated display

Brilliance in colouring is a feature of the products of the Strand Electric & Engineering Co., Ltd., which has made extensive use of glass and other translucent materials illuminated from behind. This is particularly effective in the devices incorporating portraits of His Majesty, shields, Union Jacks and crowns, many of which are arranged to accommodate flags, banners and bunting. We like this company's illuminated banner display panel with its coloured translucent front panel (also lighted from behind) suspended on a fluted pole. It bears a silhouette of the King in red, white and blue design.

Ediswan and Franco-British animated designs

A change from the more ornate designs is provided by a simple 8 ft. by 2 ft. device with a corrugated metal back in red, white and blue, floodlighted from behind a coloured translucent front panel, bearing the Royal monogram at its base. It is of very moderate price, and like most of the company's other products is constructed mainly of stout metal, cellulose-enamel finished. Metal torches in either single or double units, a corrugated metal star with a Union Jack in the centre, a papier mâché wreath and monogram, illuminated swags and monograms, large flashing flambeaux and kaleidoscope devices are other models available, but the company is willing to submit complete schemes, including the cost of erection.

Animated Signs

Both the Edison Swan Electric Co., Ltd., and the Franco-British Electrical Co., Ltd., are specialists in animated signs, and both have a large number of topical designs incorporating cut-out figures and letters. All have motor-driven flashers.

The "Ediswan" models include a roaring lion, a town crier and a rising sun with Royal monogram, all of which are most realistic. In the non-animated designs, the combination of a crown, shield or flags as a centrepiece with garlands connecting up with laurel wreaths or decorative panels looks well both by day and by night. Generally, they are illuminated by coloured sign-type lamps, which are also used extensively in conjunction with star-shaped reflectors, for an attractive range of wooden crowns, stars and monograms.

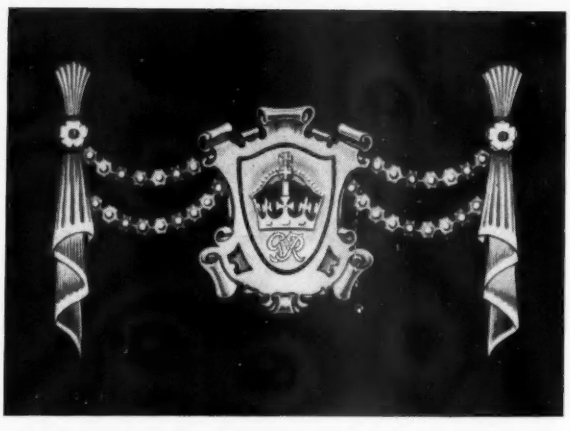
A radio station with blue neon flashing between the aerial masts and the lettering 'God Save the King" in sign lamps appearing word by word, is an example of the more ambitious of the Franco-British signs, other novelties being a 20 ft. by 15 ft. animated castle, a soldier who presents arms, a boy scout signalling, John Bull who takes his hand from his pocket and raises his hat, a soldier firing a cannon, a bellringer, a standard-bearer, and an illuminated Union Jack which is run up a flagstaff and unfurled.

The preparation of special decorations for canopies and flat surfaces has received a good deal of attention from this company, which also has a number of attractive window boxes consisting of gilt-finished stencilled panels and letters backed with translucent material illuminated from behind by 40-W lamps. These lamps also serve to light flower sprays, etc., above. Illuminated flambeaux are also introduced into some of these window boxes with good effect. Floodlighted displays for all purposes have been produced in a wide choice of designs, and there is an excellent selection available in the way of separate shields, cartouches, wreaths, etc.

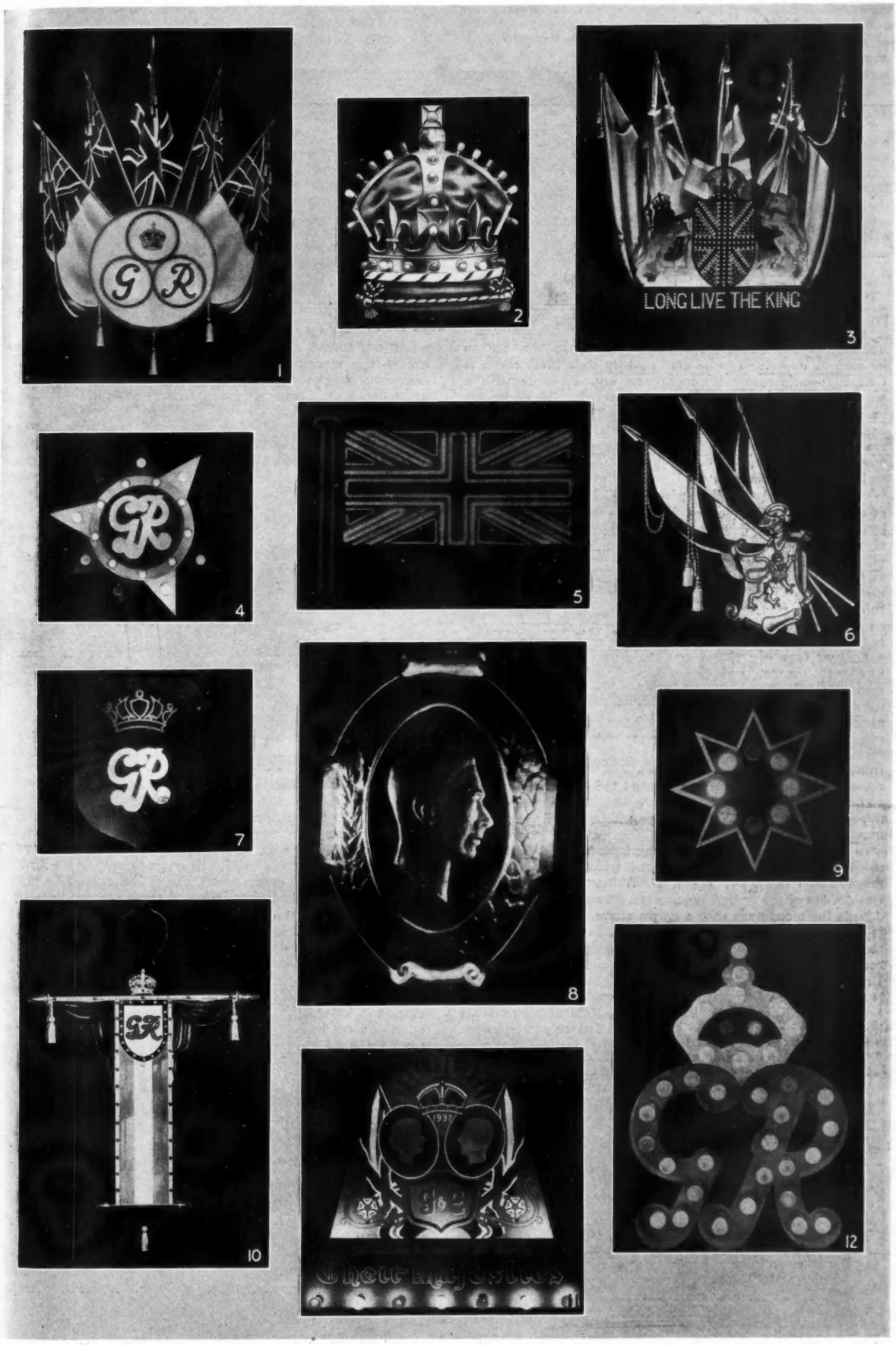
The introduction of thermal flashing equipment with the consequent elimination of any designed sequence of flashing opened up a new field for sign work which has been far from adequately explored. Such a "Guess what's coming next!" sign is the Siemens kaleidoscope. The central letters "G.R." the sectioned surround and the surmounting crown include about fifty lamps, which are recessed in enamelled metal troughs.

The possible applications of the lampholder-adaptor type of flasher (made by the Eagle Electric Co., R. E. Ollerenshaw & Co., B.T.H., G.E.C. and M. Newmark & Co., etc.) are about as numerous as the animated-sign designs. The "Mercominor" (4 A per watt) and the "Mercon" (15 A per watt), produced by Klaxon, Ltd., are good examples of motor-driven sign flashers, while the controller manufactured by Batwin Electrical Appliances, Ltd., to handle 3,000 lamps is an indication of the heavy-duty possibilities of this class of equipment. Nathan & Allen, Ltd., have a range of apparatus for controlling illuminations giving flashing intervals.

The B.T.H. scintillators are not thermal flashers, but high-speed devices making and breaking the circuit 120 times a minute. The Falk Stadelmann scintillator is described as a magnetic interrupter capable of breaking the circuit from 100 to 400 times a minute. The principle of the vibratory lighting unit produced by the Sinterae Illuminating Co. lies in the production of a peculiar optical illusion by



This B.T.H. device is illuminated by lamps in the scrollwork

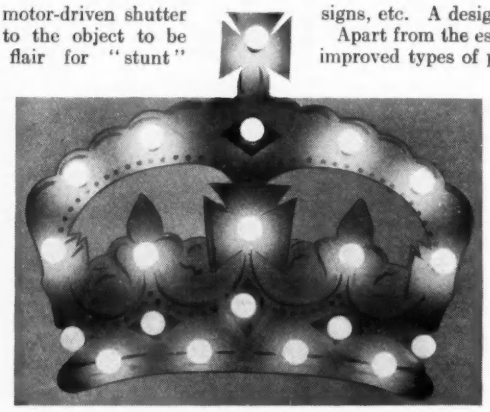


A Few of the Special Coronation Devices

1. G.E.C. design incorporating "Claudgen" neon tubes. 2. "Ediswan" moulded crown. 3. Gemosigns set-piece. 4, 7 and 12. Designs in sheet metal by D. Walter & Co. 5. Neon Union Jack (Brilliant Neon). 6. An attractive B.T.H. device. 8. Goodman papier mâché plaque. 9. Commercial Electric trough star. 10. G.E.C. banner. 11. Astralite plywood set-piece.

exposing alternately by means of a motor-driven shutter two lamps set at different angles to the object to be illuminated. For those with a flair for "stunt" controls light-sensitive equipment such as that produced by Radiovisor (Parent), Ltd., offers plenty of opportunities.

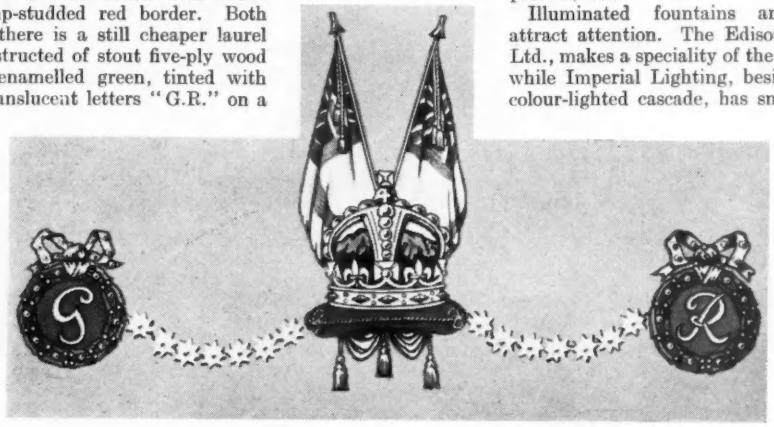
High-voltage transformers such as those produced by the Foster Engineering Co., Ltd., and the rotary convertors produced by the T.B.T. Electric Co., Ltd., are indications that there will be no difficulties in meeting the demands for special equipment required for neon sign installations.



Beeantee ply-wood crown

Papier Mâché Designs

On account of its low cost and impression of solidarity papier mâché is an ideal medium for front-of-building treatment. Effective examples of its use are to be seen in two items to be marketed by Falk Stadelmann & Co., Ltd.—a wreath with monogram and a plaque with a portrait of the King and Queen in deep relief. The portrait is in natural colours on a blue shield with white background and lamp-studded red border. Both are low priced, but there is a still cheaper laurel wreath available constructed of stout five-ply wood and metal, cellulose-enamelled green, tinted with gold and with red translucent letters "G.R." on a recessed centre panel. Another design has a block plywood "G.R." surmounting a metal box with a ruby-backed stencil reading "Long Live the King."



A suggestion by Franco-British for fronts of buildings

Another type of moulded plaque, made by Ollerenshaw & Co., is arranged so that it can be illuminated either from the front or back. It measures 18 in. by 12 in. and shows the heads of the King and Queen in bold relief in bronze and other finishes. The same company will also be supplying illuminated panels with moulded acetate lettering.

In addition to an illuminated flag trough and a neat metal shield incorporating illuminated red translucent letters and green crown with gold shield, D. Walter & Co., Ltd., have two devices of the trough type. One, measuring 3 ft. by 2 ft., depicts the monogram with a crown above. The other, which is suitable for wall mounting, is 28 in. in diameter and has red translucent monogram letters on a gold centre panel surrounded by a green ring, and red, white and blue points. Bright cellulose finishes are employed.

Another type of trough sign, which has already been mentioned in our November 13th issue, is the "Raynbo" produced by the Commercial Electric Co., Ltd. The colour isolation,

The "Neonglo" sign incorporating imitation neon letters (Allan Manufacturing Co.)

colour blending and black-out effects obtained are remarkable. Many striking designs are already available in the way of crowns, shields, stars, butterflies, etc., but there seem many further possibilities for municipal coats of arms, advertising signs, etc. A design three feet long requires only 350 W.

Apart from the essentially Coronation features, of which improved types of ply-wood Union Jacks and monograms are outstanding items, "Beeantee" Illuminations, Ltd., has among its stock lines many suitable animated display pieces in the form of kaleidoscopes, butterflies, peacocks, elephants, parrots and floral designs. Constructed of lead-coated sheet steel, they are able to stand up to the most exacting climatic conditions.

Among an excellent range of wood, papier mâché and metal signs, Imperial Lighting (Implitico), Ltd., who are particularly well known for their lighting novelties for large store fronts, seaside illuminations, etc., have, in addition to the more conventional designs, a number of devices combining shields and flower vases and also trough-type monograms and flashing kaleidoscopes. Kaleidoscopes in various sizes are also obtainable separately as well as fairy lamp crowns, stars, flower vases, butterflies, parrots, etc.

Illuminated fountains and cascades always attract attention. The Edison Swan Electric Co., Ltd., makes a speciality of the more elaborate types, while Imperial Lighting, besides a very attractive colour-lighted cascade, has small fountains at surprisingly low prices. The latter company's "pylon" is also an item worth bearing in mind. Its ninety 14-V 7-W flame-coloured lamps are lighted from a transformer in the base.

Many people would undoubtedly like to have an imposing set-piece but do not feel inclined to pay a great deal for something with such a temporary value. To cater for these, Gemosigns, Ltd., are putting out on hire two striking devices incorporating crystal glass lenses which are made to sparkle by lamps behind. The brilliant effect is especially remarkable in the design which depicts a lion and unicorn (with gleaming eyes), one on each side and a Union Jack with a jewelled crown above. In the other model a globe is substituted for the Union Jack and there are two lions.

There is certain to be a big demand for unit letters for special messages of loyalty or greeting. Gemosigns are also likely to attract a fair share of this business. For shop-window use, etc., Youngsigns, Ltd., have an inexpensive interchangeable flashing and spelling sign, the letters on which can be instantly assembled or changed.

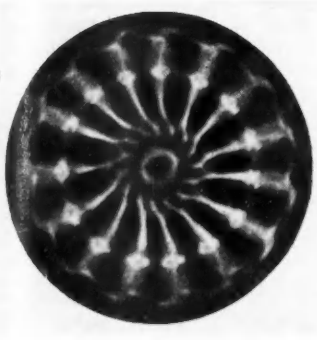
A simple design in wood (Falk, Stadelmann)

A typical example of a range of floral-reflector signs produced specially for Coronation work by Siemens has a crown and the letters "G.R." are given their shape by the particular reflectors exclusively. The letters are surrounded by a laurel border constructed of papier mâché and surmounted by a crown. About fifty lamps are used.

Portrait Designs

Many devices incorporating portraits of Their Majesties are designed so as to be easily converted into advertising signs. The already well-known "Radiant" sign (made by New Radiant, Ltd., which trades entirely through wholesalers) is an example of this. It comprises a metal case, finished outside with gold cellulose, and a portrait on a heavy glass slide. A

single 40-W lamp is required and the sign has an excellent daylight appearance. Two sizes are available measuring 14½ in. by 10½ in. and 18 in. by 13 in. respectively. The portraits of the King and Queen are on separate slides and are due on the market in a week or two, supplies being available at low prices for replacing existing slides of King Edward VIII. The case is fitted with rings for hanging and props for standing. For subsequent use spare slides can be supplied. Enlargements of these signs, with an overall size 3 ft. by 2 ft., for fronts of buildings, etc., will be obtainable exclusively from Drake & Gorham Wholesale, Ltd., and it is possible that a composite group of the Royal Family will also be produced.



Mek-Elek rotary neon sign

A natural coloured glass portrait of the King, King and Queen, or Royal Family can be inserted in the centre panel of the "Neonglo" sign made by the Allan Manufacturing Co., Ltd., in various sizes from 22 in. by 12 in. to 72 in. by 30 in. Translucent embossed acetate "G.R." letters in imitation red neon are let into the metal case, which can be finished in any colour, the whole sign being lighted from the back by one 40-W lamp. In a similar 12 in. by 9 in. indoor sign, which is made to fold flat, the portraits of the King and Queen are accompanied by a message of loyalty.

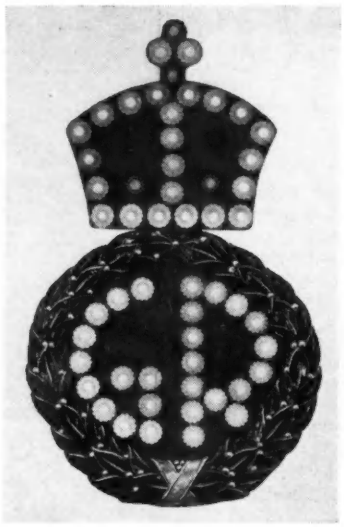
A genuine attempt to give a real artist's portrait of His Majesty is made in another glass sign by the Cinescope Publicity Co., Ltd., while the portraits of both the King and Queen appear side by side on an illuminated glass sign which Frederic Gooch & Son, Ltd., will shortly have available in full colours. Its overall size will be approximately 18 in. wide by 12 in. high, with a flat gilt frame 1 in. wide. Arranged for one 40-W lamp, it will bear the same portraits as those used separately for a pair of 42 in. by 30 in. plywood signs each of which is outlined with twelve strip lamps. While speaking of portrait signs it occurs to us that there may be a number of people who wish to illuminate actual portraits or photographs already in their possession. The special fittings supplied by Allom Bros., Ltd., and Whiteway Lighting, Ltd., are suitable for this purpose.

The above-mentioned portrait signs are intended primarily for shop-windows and other indoor use. The Strand Electric & Engineering Co., Ltd., also has a double-sided box sign for outdoor wall mounting. In addition to a papier mâché crown and the Coronation panels showing the King's head on a Union Jack, the price covers two permanent advertising panels.

While doing much business in papier mâché plaques, crowns, shields, flags, torches, etc., for outdoor displays, Léon Goodman Displays, Ltd., are particularly interested in interior decoration equipment for theatres, cinemas, restaurants, ballrooms, shop windows, etc. Their illuminated statuettes, busts, plinths and crowns are especially noteworthy, and though generally constructed of plaster or papier mâché look remarkably heavy and substantial. A useful lighting unit for wall, window or table decoration comprises a pillar and projecting plinth with a 12-in. statuette draped in tri-colour: it is lighted by means of a double-filament two-colour (red and blue) flashing bulb. Another novel item which will have a permanent value is an animated ornamental window piece with a revolving message.

An attractive wall-bracket shield (Knightshades, Ltd.)

Proprietors of restaurants, dance halls, etc., will also be interested in the translucent, metal-reinforced fabric crowns, shields, lanterns, etc., which Drake & Gorham Wholesale, Ltd., are offering. Being, however, constructed of weatherproof material with indelible designs, the devices are equally suitable for outdoor displays. There are about twenty attractive pendant or wall bracket designs to choose from and municipal coats-of-arms, advertising signs, etc., may be incorporated at a slight extra charge. A fuller description of this company's products, which include illuminated glass signs and coloured garlands, appeared in our November 13th issue.



Siemens floral-reflector sign

Something rather different in the way of lampshades is provided by the National Lighting Co., Ltd., in the form of imitation vellum books bearing coloured pictures of the King and Queen. The smaller, taking one lamp, measures 11 in. by 10 in., the large two-lamp model being 20 in. by 12 in. They are intended primarily for shop-window use, as are also three other designs (crown, pillar and fire screen) in which the company's patent transparent pictures are employed.

We have also recently had an opportunity of seeing some of the Coronation shades which Knightshades, Ltd., are putting on the market in a very wide range of tasteful and neat designs. They are made of "Lumex" imitation vellum and, while a few of the larger models are specially weatherproofed to enable them to be used out of doors, most of them will probably find their way into hotels, restaurants, shops, cinemas and private houses. The simplicity of the designs (for the most part combinations of red, white and blue sections of "Lumex" with, perhaps, shield, crown, star or lion *motifs*) will increase their value for permanent installation.

Illuminated glass portrait sign in full colours (Frederic Gooch)

Uses of Neon Tubing

Several of the special devices already mentioned incorporate neon tubing, but there are many neon manufacturers not hitherto mentioned who will carry out any special designs required. Boro' Electric Signs, Ltd., Pearce Signs, Ltd., Electrolumination, Ltd., the Electric Sign Co., Ltd., and Lund Signs are among this class, and the London & Provincial Electrical Co., Ltd., while not specialising in any particular Coronation features is prepared to hire out neon signs of any special design, doing all the necessary fitting and contracting work. Suggestions for suitable neon schemes are being made to electricity supply authorities by Ionlite, Ltd., who have produced an attractive booklet illustrating in photogravure typical installations and giving details of their maintenance and hire-maintenance terms.

Admittedly neon work is rather expensive, but the occasion provides just that small necessary impetus which will induce many people to "take the plunge" and procure a sign which costs little to run and which has a brilliance and power of attraction not possessed by other forms of illumination. There will probably be a big demand by shops for the smaller type

of neon signs which can be used in the first place as an expression of loyalty and later on be converted for more commercial applications.

With this in mind Franco Signs, in addition to listing a full range of neon window and counter signs incorporating the King's head, crowns, monograms, shields, etc., have plain ovals, shields, torches, floral designs, etc., which can be utilised for practically any type of display. Similarly London & Provincial Signs, Ltd., have small pedestal stands incorporating names, messages or designs and red, white and blue neon. In addition to making a variety of shapes and sizes of window signs to individual requirements, Neon Manufacturers, Ltd., have special Coronation units consisting of a golden plaque of the King's head surmounted by a crown and outlined in red, white and blue neon.

The "Kye Striplet" can be incorporated in practically any decoration scheme. It is sold in handy cartons

Adaptability, too, is a strong point in favour of the "Neo-Names" signs made by the Silvagrey Electric, Ltd. While a portrait or statuette of the King give a strong Coronation flavour these may be removed to leave the sign, with its interchangeable plug-in neon letters, ready for other purposes. Five- and eight-letter models are so arranged that two or more can be placed side by side to give longer words and smaller wording on non-inflammable letters can be slipped over an opal panel utilising the light from the base of the neon letters. The signs are finished in gold and chromium and have a self-contained transformer and switch.

Essentially Coronation neon signs are being made by Brilliant Neon, Ltd., in the form of outline heads of His Majesty, monograms, crowns and Union Jacks, while Beeantee are listing a neon monogram. A novelty line which has already proved popular is the Mek-Elek rotary neon sign. It is available in a wide range of pleasing designs of either 24 or 12 in. diameter. A space is provided for advertisement wording and the signs can be supplied with flashing arrangements to control shop-window lighting and other signs. A flashing neon sign with seven different changes has been developed by the Electric Sign Co., Ltd., which has also shown us a realistic neon candle and a number of other novelties.

A "Neo-Names" interchangeable neon letter sign (Silvagrey Electric)

As an alternative to neon tubing architectural lamps have much to be said for them. They can be obtained in any colour. To mention just a few companies who are now busily engaged in this type of work there are Ediswan, G.E.C., B.T.H., Tubelight Sales and Ismay Boro' Tube Light. Siemens have found a use for the architectural lamp in the self-contained illuminated device—that is, apart from the bigger display scheme for which it is usually employed. Four such lamps, together with four vacuum lamps at the corners, outline a portrait of the King. A shield-shaped background with raised lettering is surmounted by a crown and is fitted at the back with flag sockets. New lengths, new wattages and lower prices have enhanced the popularity of the "Cosmos Decora" architectural lamps (Metro-Vick.).

Quite a number of the signs already described embody imitation neon lettering and the tendency to make use of this idea seems to be increasing. The "Lite-on" neon-type sign made by the Dominion Electrical Co., in three sizes (22 in. by 11 in., 22 in. by 18 in., and 36 in. by 24 in.), has as its standard panel a loyal greeting with a crown and monogram above, but any other messages or wording may be substituted. The background of the panel is blue, the monogram red, and the crown jewels are in the correct colours. Bronze is used for the case.

Solaflex are also probably doing a somewhat similar model, and Flaire Signs can produce any special designs asked for in their neat imitation neon sign, which produces a colour-change effect by means of a device similar to that used in flickering imitation coal fires. Henry J. Alter produce a colour-change and bubbling effect in their lettering by means of an electrically-driven cylinder. All this firm's signs are interchangeable and include multiple-reflecting and clock types. A Siemens box sign leaves a little play for the ingenuity of the purchaser. Completely separate from the sign proper, but an integral part, is a separate section for containing plants, the surmounting foliage and blooms of which are "flooded" from the top.

Testing a neon crown at the Lundsigns factory

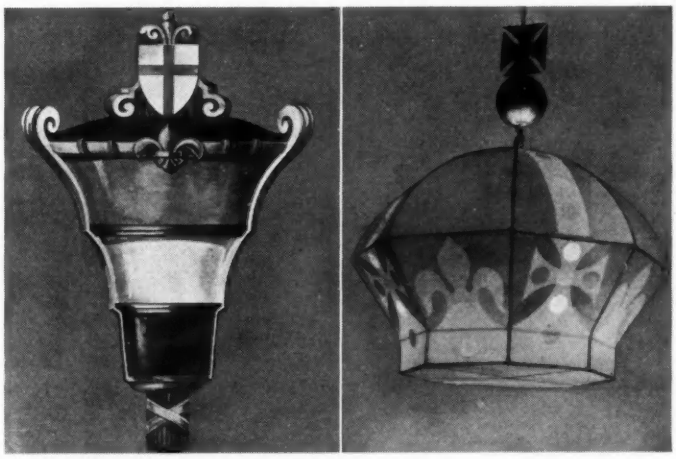
Many of the sign manufacturers we have visited during the past few weeks tell us that they are too busy with ordinary work to do much for the Coronation. The Sign Construction Co., Ltd., for instance, although undertaking a number of the larger installation jobs is definitely turning down smaller orders. Marryat & Place, Ltd., are expecting to be busy, and both Maple & Co., Ltd., and J. Akers, Ltd., tell us that they are getting out some suggested designs and are prepared to carry out special displays.

A Variety of Lamps

Any intensive illuminations effort like that to be made for the Coronation celebrations must, of course, have an influence on the various sections of the electrical industry, particularly the lamp section, and in this connection some of the views expressed by various electrical men and organisations are worth recording. Mr. C. W. Sully, director of the Electric Lamp Manufacturers' Association, says that the public now realises the advantage of picking out with light the beauties of our architecture instead of merely using buildings as scaffolding to support designs in light. Siemens Electric Lamps & Supplies, Ltd., are of opinion that enormous quantities of electric lamps will be used, and they hope that those responsible for spending public money will see that the lamps are British.

The B.T.H. Co. says that there is no doubt that vastly greater use will be made of electrical illuminations than on any previous national event. The Commercial Electric Co., Ltd., pointing to the enormous influx of visitors from abroad, says it is up to the electrical industry to take advantage of an outstanding opportunity to show what it can do in the way of illumination. The objectives of the lamp section should be to obtain temporary benefit from the increased use of lamps during the festivities and to secure a permanent increase of business by inducing temporary users of their products to adopt them for ordinary purposes afterwards. Supply authorities can help by setting a good example, ordering their requirements early and by inducing civic authorities to illuminate public buildings.

Other manufacturers, including the G.E.C., Ediswan, Cryselco, Philips, Metro-Vick, Britannia, Pope's and Splendor, all tell us that they are ready to cope with the inevitable increase in the demand for lamps and many have introduced improved coloured types. Metro-Vick have put on the market a 15-W decoration lamp at a very low price, while the Atlas Lamp Works can now supply lamps coloured either internally or externally. British Electric Lamps, Ltd., have an excellent range of decoration lamps of all kinds.



Weatherproof lanterns by the G.E.C. (left) and Drake & Gorham

A special Coronation offer is being made by Ensign Lamps, Ltd., of their "Ribble" lamps which will be colour sprayed at no extra charge. Special low prices for all coloured lamps are also being quoted by the Insular Electric Glowlamp Works, Ltd., who are introducing a new 15-W enamelled sign lamp. Tungstalite, Ltd., also considers that its latest coloured bulbs coated with heat- or weather-resisting pigmented enamel are much more pleasing in appearance than natural coloured lamps and do not suffer from fading or peeling.

Very unusual effects are produced by Astralite Electrical Products by spraying lamps with latex rubber in red, white or blue, or any other colours, including variegated effects. Although the coating can be peeled off easily, thus leaving a plain lamp if required, it is unaffected by weather conditions, and, furthermore, should the lamp be broken, will prevent the glass from flying all over the place.

Instead of using internal spraying, Briton Lamps, Ltd., are now colouring their lamps on the outside and glazing them. This produces a practically indestructible coating unaffected by the most exacting conditions. Cryselco, Ltd., has a special decoration outfit for interior decorations. It comprises eighteen olive-shaped, 14-V, 7-W lamps in various colours, with forty-one feet of silk-covered flex, sixteen holders and adaptor. For outdoor use similar lamps are available with rubber washers fitting over the cap to ensure a weatherproof joint. Standard lamps in a wide range of colours are supplied internally sprayed, the larger wattage types being exterior treated.

The London & Provincial Electrical Co., Ltd., is making ribbed tubular lamps in red, white and blue. Griffiths Bros. and Co., Ltd., suggest the use of their "Shaydolite" for colouring both lamps and floodlighting screens. It is available in a wide range of pleasing colours and is easily applied.

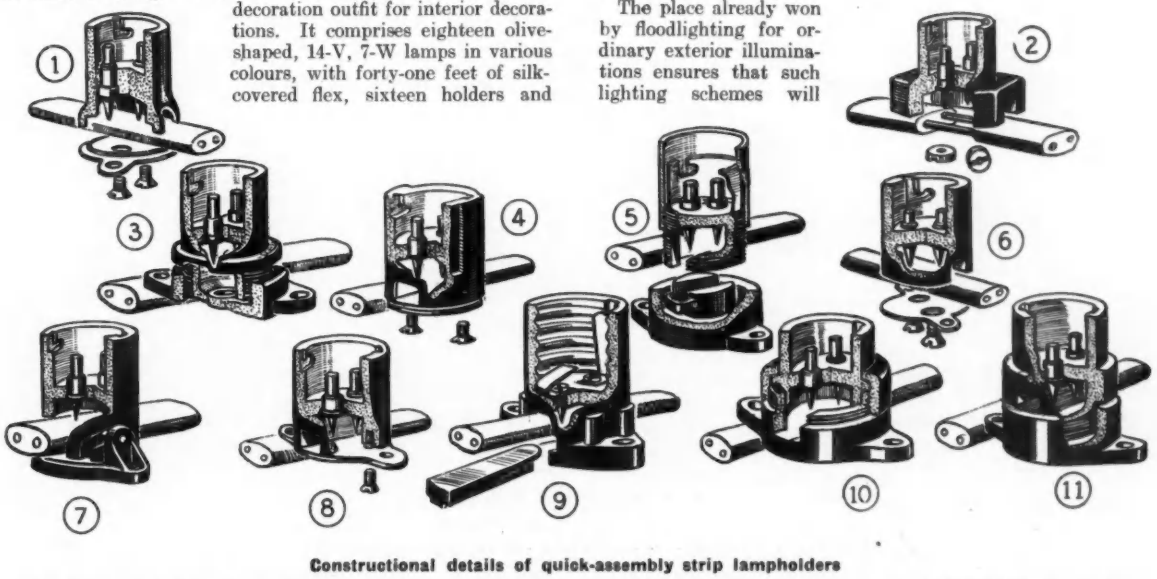
Crompton Parkinson, Ltd., whose "Kye Striplet" we described in our November 13th issue, have proved by experience that their colour spraying process is satisfactory, ensuring maximum uniformity and the least light loss. The colour stands up well to rain and sun and presents a brilliant appearance after frequent use. Any quantities of "Kye" coloured lamps in eight standard colours are available, as well as floodlighting lamps up to 1,000 W and lengths of "Derite" illumination strip with bakelite holders mounted as desired.

Particularly for indoor use the British Thomson-Houston Co., Ltd., has brought out, in addition to the "Mazda" fairy and "Bell-Star" sets, the new "Mazda Mickey Mouse" lights. They are supplied ready wired with adaptor in eight, twelve or sixteen lamp sets.

The popularity of the Blackpool and Southend autumn illuminations alone should ensure much business in striplighting for the Coronation. From the purely installation point of view the lampholder strip is the most flexible equipment possible. It is particularly suitable for outlining buildings, while almost any character can be featured on a sign.

Last-minute work appears to be inevitable for such events as the Coronation, and from this point of view the quick assembly strip lampholder is a big asset. While the spike connector is common to several models, they nearly all have some distinctive feature, relating generally to the method of accommodating the cable, and rather than attempt to enter into what might be regarded as tedious detail we have had the accompanying drawings specially made to show the ideas embodied in various patterns. By employing special rubber sleeves to cover the lamp and top of the holder the whole of the latest type of "Ediswan" fitting can be immersed in water with complete safety.

The place already won by floodlighting for ordinary exterior illuminations ensures that such lighting schemes will



Constructional details of quick-assembly strip lampholders

1. Special low-priced Astralite recessed-metal back model. 2. "Fairyland" (Imperial Lighting Co.), screw-nut contact to bared conductor. 3. "Beeantee" Illuminations, watertight joint and weatherproof shield. 4. Ward & Goldstone, rubber pad between metal back and holder. 5. "Lite-On" (Dominion Electrical Co.), disc insert ensures constant contact. 6. Senator, simple metal back. 7. Astralite, b.c. fixing for bakelite back and watertight gasket. 8. Briton Lamps, lugged metal back. 9. G.E.C. cable wedged in position. 10. "Agro" (T.M.C.-Harwell), binding ring clamps cable. 11. "Fixalite" (Imperial), revolving block exerts pressure on cable.

play a very prominent part in the Coronation illuminations. As has been and is being proved in connection with all other sections of the electrical industry it is the smaller consumer in the mass who brings by far the most profitable business and gives the industry the biggest opportunities for service. Every shopkeeper, no matter how small, is a potential floodlighting customer, and from a study of trade literature and interviews with manufacturers and engineers we are convinced that there is on the market equipment which will meet every requirement. The British Thomson-Houston Co., Ltd., has its eye on shops and even private dwellings in introducing a low-priced projector. Manufacturers, just before the Jubilee celebrations, were confronted with the choice of hiring or selling floodlighting projectors. That problem has proved to be not so difficult as it then seemed, and a range of temporary installation equipment is now available. As Mr. V. Saady, of Becantee Illuminations, Ltd., said in referring to projectors introduced by that company, the low price has been brought about by simplicity in design and construction. These 500- to 1,000-W spun reflector units are listed at 55s. A very wide range of projectors has been introduced by the General Electric Co., Ltd., at prices from under £3 to more than £13 for every conceivable class of temporary installation job and for many permanent and semi-permanent schemes.

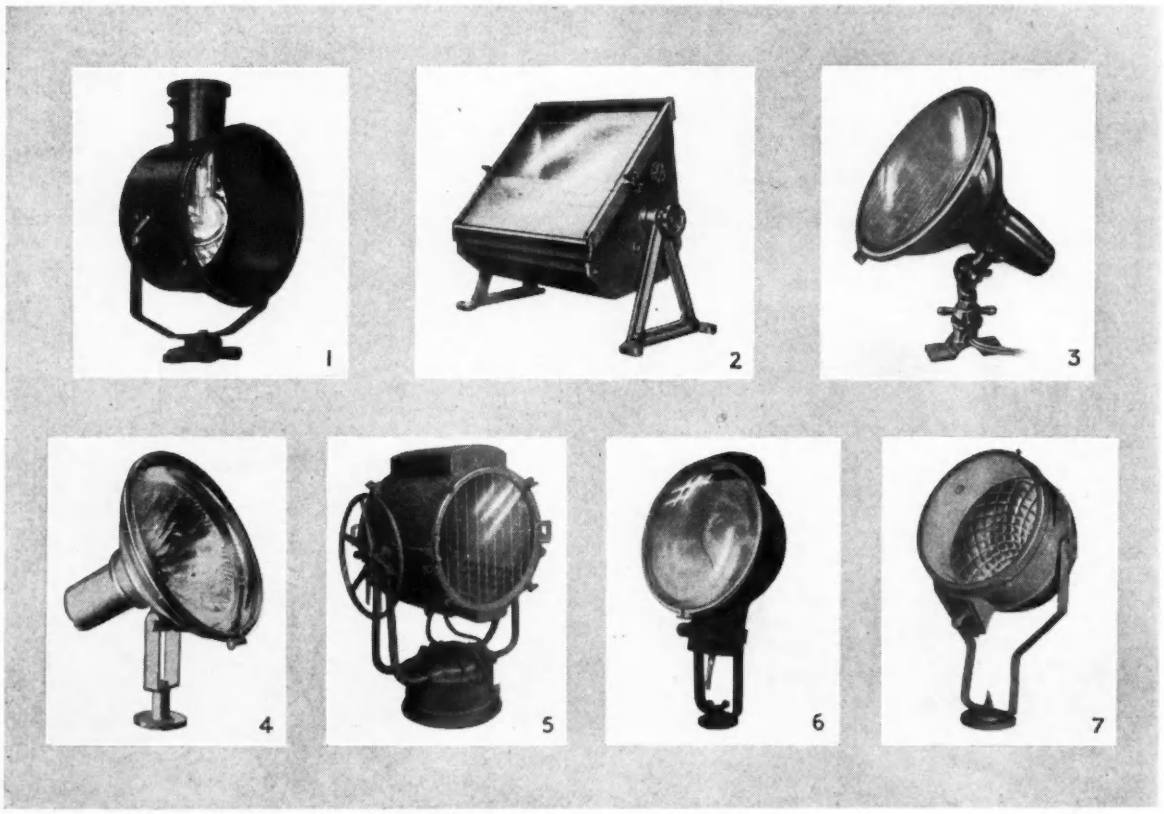
An imposing Siemens design

An outstanding example of simplicity of construction is a rectangular unit introduced by Franco Signs. The white-enamelled interior surface of the sheet-metal body provides the reflecting medium, and with a front 19 in. square the unit will take a lamp of up to 1,000 W. Perhaps the lowest price for such temporary equipment is the 14s. charged for one of the "Temco" floodlights introduced by T. M. C. Harwell (Sales), Ltd. It has an 11-in. diameter heavy spun reflector with a matt aluminium reflecting surface and is fitted with a glass-substitute window. This fitting will take a 60- to 150-W lamp. A larger model is suitable for a 200-W lamp.

Four "Jubilee" floodlights introduced by Rowland's Electrical Accessories, Ltd., are designed for lamps in sizes from 60 W to 500 W. The smallest model is 8 in. in diameter and the largest 14 in. in diameter. Mr. Langrish, of Eca-Ray Sales, Ltd., spoke strongly on the advisability of using, where possible, low-wattage lamps for temporary installation work. The company's "Kingsway" is suitable for Coronation work; it has a spun glass dome, is 10 in. in diameter and costs 40s. Securing the two 200-W lamps horizontally at the centre of the new Eca-Ray weatherproof two-light fitting has increased the light output considerably by utilising the greater reflecting surface at the ends. This fitting will light a 14-ft. front shop adequately.

There is another class of floodlighting projector known as general service or general purpose. Such equipment is not necessarily designed specially for temporary installation work, but it should prove very useful in this field because in very many cases precision, accuracy and efficiency will not be required for the Coronation illuminations.

A general purpose floodlight unit introduced by the Revo Electric Co., Ltd., has a sheet-steel "chimney" with a heavy gauge chromium-plated reflector. It is 12 in. in diameter and takes a 300- to 500-W lamp. The body and reflector of a G.E.C. general utility floodlight are formed in one piece of

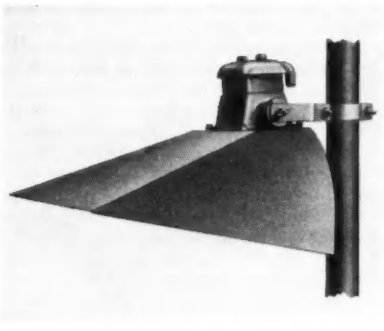


Typical floodlighting equipment

1. Kandem "No. 3" long-range ventilated type. 2. B.T.H. "Mazdalux Four." 3. Benjamin specular floodlight. 4. Curtis "Moonlight." 5. London Electric Firm 24-in. display searchlight. 6. Floodlighting and Fittings, "Type D." 7. Eca-Ray "Kingsway."

a non-tarnishable metal. With a 500-W or 1,000-W lamp the projector will give medium- or narrow-beam distribution.

A Rowlands general purpose projector (14 in. diameter, 300 to 500 W) is said to have a rather more concentrated beam than that of the average general-purpose floodlight, so that it is suitable for lofty buildings. The Strand Electric "General" flood is described as giving a wide-angle beam suitable for use at close range for illuminating posters, small buildings and other general work (15½ in. diameter, from 300 to 500 W lamp).



Simplex "Reflecto-flood" open-type floodlight

D. Walter & Co., Ltd., have introduced an octagonal general-purpose unit fitted with fluted glass reflectors, a hinged door and a heat-resisting glass front (14 in. diameter, 300 to 500 W). The B.T.H. "Mazdalux Eight" is designed to accommodate two types of reflector—vitreous enamelled for a wide-angle beam or specular with a chromium-plated surface for a narrow-angle beam. This is made in two sizes for 150- to 200-W and 300-W lamps, respectively. The circular general purpose floodlight produced by the Benjamin Electric, Ltd., is suitable for most applications, involving moderate running and maintenance costs. It is weatherproof and has a universal movement and a presetting device on both axes (26 in. diameter, 500 W, 1,000 W or 1,500 W).

The "Argus" floodlight produced by the Edison Swan Electric Co., Ltd., has low vertical height for easy concealment behind parapets. Designed primarily for building floodlighting, it is also suitable for general work. The mirror-lined body is constructed from heavy-gauge lead-coated sheet steel (500 W to 1,000 W).

Three models recently introduced by Zeiss Ikon, Ltd., have the same appearance and dimensions, but their functions are varied by the different kinds of mirrors; No. F.G.6 has a bell-shaped mirror and gives a very wide dispersion (300 W to 1,500 W). No. F.Z.6 has a stepped mirror and gives a more concentrated light (300 W to 1,500 W) and No. F.P.6 has a scientifically constructed parabolic mirror and can be focused for a very long throw, when employing a projector type lamp (300 to 1,000 W).

Siemens "Filton" projector

In addition to its "Sunlight" heavy-duty 750-1,000 W projector, the Curtis Lighting Co. of Great Britain, Ltd., makes two smaller models with wide applications. The "Moonlight" 300-500-W type is used for industrial, commercial or civic floodlighting while the "Starlight" 200-250-W model is suitable for recessing into cornices. In each case the housing is of heavy gauge copper, with clear front covers of heat-resisting glass. The reflectors are of crystal glass coated with a pure silver reflecting surface covered by a special protective backing. The Metropolitan-Vickers Electrical Co., Ltd., is introducing three floodlights which, it is claimed, will cover all requirements and the largest installation.

Electric Discharge Lighting

With regard to the use of electric discharge lamps for floodlighting, Philips Lamps, Ltd., consider them more suitable for colour work, particularly sodium lamps, mainly on account of their monochromatic light, resulting in greater definition of building details. A Revo projector specially made for use with a sodium lamp has heavy-gauge stainless steel reflectors designed for wide diffusion. Measuring 30 in. by 19 in. the unit takes a 150-W lamp. New equipment introduced by Holophane, Ltd., allows the lamp to be used vertically. There are two sizes, 200 W and 500 W, and they have a special concentrating prismatic reflector.

Wide ranges of colours are obtainable for such tubular lamps as the G.E.C. "Osira" and the "Sieray" (Siemens Electric Lamps & Supplies, Ltd.). A "Sieray" red floodlighting lamp, with a two-pin cap at each end, produces a 24-in. luminous column and is loaded at 200 W. The "Milford" projector for accommodating this provides a narrow vertical and a wide horizontal spread. In similar triangular design and horizontal swivelled mounting the "Chelmsford" is suitable for 250- and 400-W discharge lamps which provide blue, green or primrose lighting. Red, blue, green and yellow are available from the "Osira" tubes for which there is a special trough-type projector. There is also a special rectangular projector to take the 250- and 400-W "Osira" high-pressure mercury-vapour lamps.

Combinations of the transformer choke and condenser equipment in the discharge fitting housing, include the "Solux" produced by the Wardle Engineering Co., Ltd., with a stainless steel reflector of special contour secured to cast aluminium end plates. Measuring 24¼ in. by 20½ in. it is designed for use with a 150-W sodium lamp. The "Chelmsford," to which we have just referred, also houses the electrical gear in the body of the fitting and so does the "Philora" 150-W sodium floodlight. An unusual note in discharge lighting projectors is the 400-W mercury lamp fitting of the same make. The lamp projects upward within the bowl of the reflector.

In spite of the advent of the discharge lamp colour screens are still popular. For example, the range of Eca-Ray detachable screens, suitable for fixing to all circular floods and spotlights, are constructed of non-inflammable celluloid. Colour-changing floodlighting is provided by two unusual equipments made by D. Walter & Co.—one for concentration on a certain area such as a swimming pool, and the other for more general illumination such as might be required in a garden. The former model has a motor-driven stippled glass screen in front of an 8-in. projection lens, while in the second case the multi-sided lantern itself revolves. Each side has a screen and the result is revolving beams of varied colour.

The major problems in any floodlighting scheme are related to the area to be lighted and the situation of the light source, and, generally, there are three types of units, namely, the narrow beam suitable for illuminating objects from a relatively large distance; the wide-angle equipment for lighting a large area at short range; and the medium-angle equipment. The Siemens "Filton" is a long-range narrow beam projector for the illumination of towers and church steeples from a distance. The narrow-beam projector of the Simplex Electric Co. takes a 500-W or a 1,000-W lamp, is 17 in. in diameter and is suitable for long-range work or oblique throws. The Strand Electric "Outdoor Pageant" lantern is said to provide a very intense narrow soft edge beam. A spun copper door at the rear carries a 10-in. diameter silvered-glass parabolic reflector. In an actual installation this lantern has a 350-ft. throw. A narrow-beam Benjamin projector has a normal beam angle of from 10 to 12 deg. which may be increased to 35 deg. by diffusing glass. Philips narrow-beam floodlights with mirrored reflectors provide 15-deg. and 30-deg. angles (smooth or faceted surfaces, respectively).

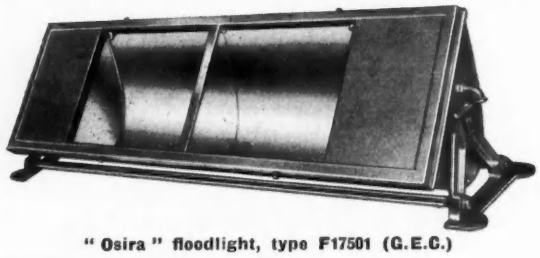
A G.E.C. unit described as having a narrow-angle beam for the illumination of small architectural features could well be described as a spotlight. The Holophane narrow-angle projector (100, 250, and 500 W) is advocated for spotlighting clocks, while a unit suitable for mounting in trees is the "Baby" spotlight introduced by Falk, Stadelmann & Co., Ltd. This is rectangular in shape, has a lead-coated steel housing and a 6-in. lens, and takes a 250-W or a 500-W lamp.

Normally spotlighting is associated more with internal than external work, and no doubt in ballrooms and similar places there will be scope for business. A good example of an internal projector is that produced by the Improved Products Co., Ltd. A fine dual silvering process provides a highly magnifying reflecting surface. The bell is 10 in. in diameter, and there is a focusing arrangement.

For the Jubilee military searchlights were used for

A long-range floodlight fitted with transformer to enable 12-V lamps to be used (Davis Bros., Illuminating Engineers, Ltd.)

lighting towers and clocks from very long distances. We suggest, however, big possibilities by way of celebration display work about docks and harbours. A 24-in. display searchlight produced by the London Electric Firm has a silvered glass parabolic mirror and it can be turned the full circle. This



"Osira" floodlight, type F17501 (G.E.C.)

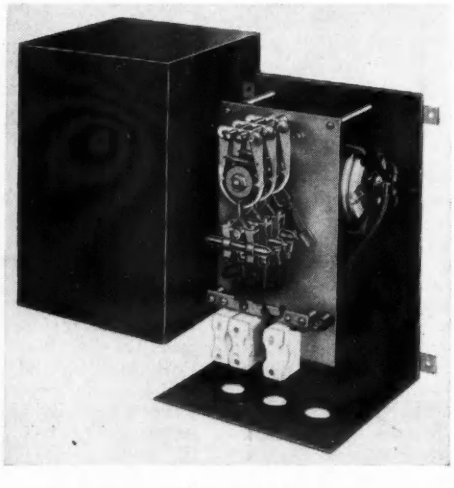
style of projector can be furnished to take a lamp up to 5,000 W.

The long-range equipment is often, in principle, the same as the narrow-beam equipment, but is not necessarily so. The following items are further long-range units: The Franco-Sign unit (500 W to 1,000 W), with chromium-plated reflector and cast-iron case; the Falk, Stadelmann "Bisley" unit (500 W to 1,500 W), with hammered-glass reflector and lead-coated steel housing; the "Mazdalux Three," with spun metal body and double parabolic reflector (500 to 1,500 W); the ventilated projector produced by Kandem Electrical, Ltd., with weatherproof front glass and simple lamp-aligning device (100 W to 2,000 W); and the 1,000-W Holophane projector which is supplied for three types of distribution—concentrated, spreading and extensive. An introduction by Davis Bros., Illuminating Engineers, Ltd., is a projector with a long-range parallel beam (600 ft.) with a 10-deg. variation in focus. This is a low-voltage unit with a transformer in a separate housing to which it is attached.

Colour flood for flower-bed (D. Walter & Co.)

The long-range Kandem projector is especially suitable for floodlighting high buildings at short projection. Rectangular in shape, its face for vertical surface work is slightly inclined from the horizontal. The sheet-steel housing carries a weather proof front glass, and there is a special long-focus parabolic mirror and side reflectors. The vitreous-enamel reflector of the Simplex wide-beam projector gives a very wide flooding without a definite beam.

The Philips F.L.A. broad-beam circular floodlight (500 W to 1,500 W) has a spread of approximately 120 deg. But most wide-angle equipment appears to be of the rectangular type. The No. 2 Davis floodlight measures 27 in. by 22½ in., takes up to a 1,000-W lamp and is designed for placing at a distance not less than one-third the building height. The Siemens "Drayton" takes a 300-W or a 500-W lamp and is suitable for intensive work on large areas. The face of the Benjamin rectangular flood is in two planes with a slight offset, resulting in a 160-deg. spread vertically and 90-deg. spread horizontally. Maximum intensity upwards is the feature of the 500-W to 1,000-W square Strand Electric flood. The vertical beam angle is 99 deg. and the horizontal angle 103 deg. The 20-in. square "Brite-Lite" wide-angle unit of D Walter & Co. has a lead-coated steel body lined with a fluted and silvered metal reflector.



Three-way "Mercon" flasher (Klaxon)

Wide angle does not necessarily mean short projection, but the following are definitely styled limited-projection or limited-space units. For discharge lamps the Siemens "Stafford," with two sharply offset projection planes is designed for maximum and minimum projection limits of 10 ft. and 4 ft., respectively. The "Manton" of the same make, but for 300- to 500-W m.f. lamps, is designed for use where very little space is available in front of the buildings. The wide-beam Kandem projectors have scientifically designed vitreous enamelled reflectors which produce an extensive flat beam of 130 deg. The "Mazdalux Two," with its angled window almost in the vertical plane is suitable for upward floodlighting where an offset of 10 ft. or over is available. Suitable for mounting at distances from 15 ft. to 30 ft. from the object is the "R.E.A.L. Senior" (Rowlands) floodlight. While this unit is designed mainly for vertical mounting it can be used satisfactorily at an angle of 45 deg. up or down.

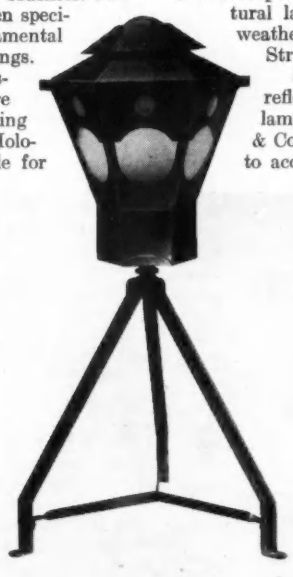
Zeiss Ikon universal projector

The 24-in. square Revo 1,000-W wide-beam projector has a narrow-beam companion of the same size. The 500-W G.E.C. F.E.1162 upward projecting floodlight is designed for flooding building faces from a limited offset, while the Franco-Signs "No. 72/B" unit is intended for similar work, but for mainly horizontal projection at short range. With a 15-in. square window the "Efesca Merton" is suitable for flooding a wide area at close range. Typical examples of medium-angle projectors are the "No. 46" Strand Electric and the Siemens "Acton" unit. They are both circular and suitable for flooding objects a fair distance away and both take up to a 1,000-W lamp. The Strand equipment has a 54-deg. beam angle.

The R.E.A.L. "Admiralty" floodlight (300 to 500 W, 12 in. by 24 in.) provides a beam which is wide vertically and comparatively narrow horizontally, while the Siemens "Brentford" has a wide beam spread in both the vertical and horizontal planes. A rectangular beam in the vertical plane is given by the Siemens "Langford," which accommodates a 250-W or 400-W vertical discharge lamp and is suitable for lighting memorials. In addition to the Simplex narrow-beam and wide-beam projectors there is an elliptical unit which embodies a chromium-plated reflector. But the concentrated light is spread into an elliptical beam with the maximum width either vertically or horizontally, so as to give a high "waste light factor." The projector is circular and is available for from 300-W to 1,000-W lamps.

Minimum side spill is also stressed for the "Brite-Lite" high-power concentrating floodlight. It has an 18-in. diameter high-intensity silvered reflector and accommodates a 500- to 1,500-W lamp. Importance is attached in varying degrees to providing even illumination. For instance, referring to their wide-beam floodlights, Kandem Electrical say that the intensity throughout the beam is so controlled that there is no peak of light in the centre, and that the special parabolic reflector of their narrow-beam units prevents striations or unevenness of the beam. Speaking of their exterior projectors with up to 160 deg. spread, Floodlighting & Fittings, Ltd., say that there is no spot effect and that the floodlight may be placed close to its objective if necessary.

For immediate upward flooding there are a number of wall bracket units such as the "Efesca Manchester," which has 12-in. extension brackets and a removable clear glass top. An 18-in. by 12-in. model takes two 100-W lamps. Holophane sodium-lamp projectors for 50 W to 65 W and 100 W to 150 W are available with substantial 30-in. wall brackets. The Holophane "Ealing" bracket projector has been specially designed for fixing above facias as an ornamental unit for floodlighting the upper storeys of buildings. The detachable top frame is fitted with a prismatic heat-resisting glass projector lens. There should be ample opportunities for floodlighting buildings from lighting standards and the Holophane wide-angle pedestal projector is available for this purpose. The outer ornamental lantern contains an octagonal prismatic reflector built up on the "Hedralite" principle. The beam angle is 90 deg. For mainly downward projection for ground lighting there are a number of pole mounting units. The Benjamin "Duoflux" has a large diffusing reflector supplemented by a highly polished projector and it gives a spreading flood and a strong directional beam.



"Brite-lite" revolving colour-changing floodlight (D. Walter & Co.)

The new Revo pole mounting floodlighting unit is intended for use with mercury lamps and consists of a sheet-steel vitreous-enamelled reflector with an auxiliary stainless-steel reflector and a heat-resisting glass cylinder. The Simplex "Reflecto-Flood" for the illumination of open spaces consists essentially of a vitreous enamelled steel reflector giving a wide general flood in a forward and downward direction, while in the beam type an additional concentrated beam is provided by a supplementary reflector behind the lamp. It is available for 300-W to 1,500-W lamps. The Rowlands "Realux" is suitable for use with discharge lamps and it can be mounted at heights up to 45 ft. above ground level. A double bracket ensures vertical disposition of the lampholder. There is a similar model for use with ordinary lamps.

Increasing support is being given to the idea of illuminating decorations as distinct from providing decorative illuminations. In this connection the problems seem similar to those of facia lighting for which efficient equipment has long been available.

The weatherproof facia reflectors of Linolite, Ltd., have concentrating reflectors in a lead-coated steel cover. The lamps are screened. All lengths are available with suitable bracketting facilities. For upward facia lighting Linealux, Ltd., has a weatherproof and glass-covered unit for use with architectural lamps in lengths up to seven lamps long. The weatherproof "Straight-Lite" unit supplied by Straight-Lite Reflectors, Ltd., has a lead-coated iron angular casing fitted with a polished aluminium reflector, and it accommodates double-ended tubular lamps. The "Brite-Lite" facia trough (D. Walter & Co.) is made in lengths up to 9 ft. and is designed to accommodate up to 60-W m.f. lamps.

The "Efesca" weatherproof colour troughing which is designed mainly for outlining buildings should prove useful for illuminating shallow decorations. Up to 60-W lamps at 9-in. centres are welled beneath the surmounting convex reflector. Siemens have introduced the "Norton" particularly for lighting flags and devices. It takes up to a 200-W lamp and is designed for vertical projection. The "E" unit of Floodlighting & Fittings is designed for spotlighting poster boards and facias.

Illuminating garden foliage presents a very similar problem to that of lighting decorations, so that equipment referred to under any one of the headings should not be dissociated from the other. The G.E.C. rectangular floodlight "F5726" is suitable for illuminating gardens from a medium offset and accommodates up to a 1,000-W lamp. There is also a circular vitreous enamelled unit giving a diffused beam for the illumination of gardens (1,500 W). The Strand Electric "F.8" 1,000-W flood with a 104-deg. beam angle is suitable for similar purposes. This circular model is pivoted on a universal bracket.

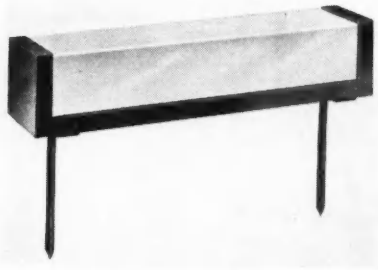
The "Mazdalux Seven" is primarily designed for tree and foliage lighting, and it can be readily attached to tree trunks and suitably camouflaged. The interior is lined with a reflecting mirror and an adjustable bracket allows for irregular contours of the trees (200 W or 300 W). The Siemens "Oxford" is suitable for illuminating long stretches of low trees having a

Further examples of floodlighting equipment

1. Wardle "Solux." 2. Improved Products "Dual-Silver." 3. Falk, Stadelmann "Stratford." 4. Special fitting for temporary work (T.M.C.-Harwell). 5. Revo "C.8774." 6. Strand low-voltage spotlight. 7. "Coronation" model (Rowlands Electrical Accessories).

narrow beam in the vertical plane and a wide spread in the horizontal plane. The Holophane "Rhyl" flood was introduced for permanent garden lighting. The concentrating prismatic reflector beam is supplemented by lighting from side and back panels.

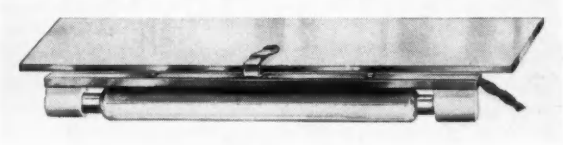
Striking effects in the garden and more particularly, perhaps, along drives, are obtained from the multiple lamp standard such as that introduced by Siemens. A tubular stand carries six arms in staggered formation, and from each arm is suspended a totally enclosed spherical or cube fitting. A seventh fitting surmounts the standard.



Siemens flower-bed unit

Perhaps the biggest illumination lesson of the Jubilee was the effectiveness of flower-bed lighting. Two schemes adopted by Siemens are the inverted trough for downward projection and the opal enclosed unit for outlining beds. Both are supplied with suitable spikes. D. Walter & Co. are introducing a unit shaped like a sunshade for downward projection. A local garden floodlighting equipment by Rowlands is of the weatherproof trough type and has suitable spikes. There is a B.T.H. dispersive unit for mercury discharge lamps, and it is intended for suspension over the flower beds. The Benjamin "Ile" fitting is particularly suitable for permanent garden work.

Whilst the notes on floodlighting equipment are based on information supplied by the manufacturers and are designed mainly to assist contractors to select equipment suitable for the problems in hand, in many cases where permanent schemes are to be prepared, it is advisable to obtain expert advice on the broader questions such as light values required and location of the light sources. Among the persons and organisations who act in such a consultative capacity may be mentioned Brown Brothers, Ltd., who have a special lighting service for floodlighting schemes particularly for garages.



Boula silvered striplight and holder

Particularly for outdoor sites in fairly dark surroundings the "Lite-on" fluorescent lighting recently introduced by the Dominion Electrical Co. holds out an attractive alternative to floodlighting or individual signs. The principle involved is similar to that employed in some of the latest electric discharge tubes, namely, the employment of a fluorescent substance which transforms a portion of the ultra-violet spectrum into visible rays. In this case, however, it is the surface of the object to be illuminated that receives the coating of the chemical and *only* ultra-violet rays are employed, the source being a quartz lamp of the medical type fitted with a special filter cutting off all visible light. Normal lighting introduced by means of a flasher will give two distinct effects of colour and can also give the impression of movement.

The shop window offers excellent opportunities for display work, and there will certainly be a great deal of brightening up done in this field, specially for the occasion by means of normal equipment. To review such apparatus, however, would probably require more space than that given to the Coronation equipment, and would therefore, we think, distract attention from the main issue. Apart, therefore, from the following very brief references to equipment to which our attention has been drawn specially we do not propose to deal with this subject.

The "Lite-on" imitation neon sign (Dominion Electrical Co.) described on page 92

Intensive, extensive and spotlight effects are obtainable from a range of "Philiray" reflectors (40 W to 200 W). The high angle for vertical-display work is the feature of the No. 48 reflector produced by Improved Products Co., Ltd. The Zeiss "Slant" reflectors give a great dispersion of light and are therefore suitable for deep windows dressed fairly high at the back. Harcourts upwards projecting "X-Ray" reflectors should prove useful for many special and difficult displays.

Rectangular reflectors for general use are produced by Hagger & Hawes, Ltd., in sizes up to 24 in. by 24 in. (200-W lamps). The "Boula" silvered striplight (tubular lamp) is applicable to many window schemes. A special holder will take a 30-W or 60-W tubular lamp.

Manufacturers of Electrical Equipment for the Coronation mentioned in this Issue

Akers, J., Ltd., 5 and 6, Coventry St., W.1.
Allan Manufacturing Co., Ltd., 37, Farringdon St., E.C.4.
Allom Bros., Ltd., 16, Grosvenor Place, S.W.1.
Alter, Henry J., 179, Great Portland St., W.1.
Ardente Acoustic Laboratories, 11, Pollen St., W.1.
Astralite Electrical Products, 60, Red Lion Sq., E.C.1.
Atlas Lamp Works, Ltd., 105-9, Judd St., W.C.1.
Batwin Electrical Appliances, Ltd., 138, Southwark St., S.E.1.
Beeantee Illuminations, Ltd., 88, Goswell Rd., E.C.1.
Benjamin Electric, Ltd., Brantwood Works, Tariff Rd., Tottenham, N.17.
Boro' Electric Signs, Ranelagh Rd., S.W.1.
Boula Reflector Lamp Co., Ltd., 156, Charing Cross Rd., W.C.2.
Brilliant Neon Co., Ltd., 131, Uxbridge Rd., Shepherd's Bush, W.12.
Britannia Electric Lamp Works (1934), Ltd., 92-94, Paul St., E.C.2.
British Electric Lamps, Ltd., Spencer Hill Rd., Wimbledon, S.W.19.
British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.
Briton Lamps, Roman Wall House, Crutched Friars, E.C.3.
Brown Bros., Ltd., 22, Great Eastern St., E.C.2.
Cinescope Publicity Co., Gaters Mill, West End, Southampton.
Claude General Neon Lights, Ltd., Parker St., Kingsway, W.C.2.
Commercial Electric Co., Ltd., 32, Queen Victoria St., E.C.4.
Crompton Parkinson, Ltd., Bush House, Aldwych, W.C.2.
Cryselco, Ltd., Kempston Works, Bedford.
Curtis Lighting Co. of Gt. Britain, Ltd, Aldwych House, W.C.2.
Davis Bros., Illuminating Engineers, Ltd., 22, Buckingham St., W.C.2.
Dominion Electrical Co, 60, New Cavendish St., Gt. Portland St., W.1.
Drake & Gorham Wholesale, Ltd., 77, Long Acre, W.C.2.
Eagle Electric Co., 38-40, Eccleston Sq., S.W.1.
Eca-Ray Sales, Ltd., 3, Sandland Place, High Holborn, W.C.1.
Edison Swan Electric Co., Ltd., 155, Charing Cross Rd., W.C.2.
Electric Lamp Mnfrs.' Assen. of Gt. Britain, 25, Bedford Sq., W.C.2.
Electric Sign Co., 22, Ely Place, E.C.1.
Electrolumination, Ltd., 9, Barnsbury Park, N.1.
Ensign Lamps, Ltd., Kent St., Preston.
Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Rd., E.C.1.
Film Industries, Ltd., 60, Paddington St., W.1.
Flaire Signs, Ltd., Shell Mex House, W.C.2.
Floodlighting & Fittings, Ltd., 294, Gray's Inn Rd., W.C.1.
Foster Engineering Co., Ltd., Apex Works, South Wimbledon, S.W.19.
Franco-British Electric Co., Ltd., 25-27, Oxford St., W.1.
Gemosigns, Ltd., 56-7, Woburn Place, W.C.1.
General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.
Gooch, Frederic, & Son, Ltd., 2, Clements Rd., Bermondsey, S.E.16.
Goodman, Léon, Displays, Ltd., 139-147, Fonthill Rd., N.4.
Griffiths Bros. & Co. (London), Ltd., Macks Rd., Bermondsey, S.E.16.
Haggar & Hawes, Ltd., 231, City Rd., E.C.1.
Harcourts, Ltd., 21a, Newman St., W.1.
Holophane, Ltd., Elverton St., Vincent Sq., S.W.1.
Imperial Lighting Co. (Implitico), Ltd., 2-6, Pocock St., S.E.1.
Improved Products Co., Ltd., Craven House, Kingsway, W.C.2.
Insular Electric Glowlamp Works, Ltd., New Cleveland St., Hull.
Ionlite, Ltd., 89, Scrubs Lane, N.W.10.
Ismay Boro' Tube Lights, Ltd., 11, Queen Victoria St., E.C.4.
Kandem Electrical, Ltd., 769, Fulham Rd., S.W.6.
Klaxon, Ltd., 36, Blandford St., W.1.
Knightshades, Ltd., 36, Queensway, Ponders End, Middlesex.
Linealux, Ltd., 119-123, Cloudesley Rd., N.1.
Linolite, Ltd., 96, Victoria St., S.W.1.
London Electric Firm, Brighton Rd., South Croydon.
London & Provincial Electrical Co., Ltd., 60, Ashbrook Rd., N.19.
Lund Signs, 55, Bendon Valley, Earlsfield, S.W.18.
Maple & Co., Ltd., 141-150, Tottenham Court Rd., W.1.
Marconiphone Co., Ltd., 210, Tottenham Court Rd., W.1.
Marryat & Place, Ltd., 40, Hatton Garden, E.C.1.
Mek-Elek Engineering Co., Ltd., 16, Douglas St., S.W.1.
Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.
Mobile Amplifiers, Ltd., 1, Balham High Rd., S.W.12.
Nathan & Allen, Ltd., 131, Victoria St., S.W.1.
National Lighting Co., Ltd., 19, St. Bride St., E.C.4.
Neon Manufacturers, Ltd., Regent House, Kingsway, W.C.2.
Newmark, M., & Co., 77, Milton St., E.C.2.
New Radiant, Ltd., Gwydir Chambers, 104, High Holborn, W.C.1.
Ollerenshaw & Co., 81, Blackfriars Rd., S.E.1.
Pearce Signs, Ltd., 274, New Cross Rd., S.E.14.
Philips Industrial, 145, Charing Cross Rd., W.C.2.
Philips Lamps, Ltd., 145, Charing Cross Rd., W.C.2.
Pope's Electric Lamp Co., Ltd., 5, Arthur St., W.C.2.
Radiovisor Parent, Ltd., 28, Little Russell St., W.C.1.
Revo Electric Co., Ltd., Tipton, Staffs.
Rowlands Electrical Accessories, Ltd., Hockley Hill, Birmingham.
Senator Lamp House, 13, West Campbell St., Glasgow.
Shaftesbury Microphones, Ltd., 24, Aldersgate St., E.C.1.
Siemens Electric Lamps & Supplies, Ltd., 38-9, Upper Thames St., E.C.
Sign Construction Co., 77, Grosvenor Rd., S.W.1.
Silvagrey Electric, Ltd., Harman Chambers, High St., Dorking.
Simplex Electric Co., Ltd., 159, Great Charles St., Birmingham.
Sinterae Illuminating Co., 54, Victoria St., S.W.1.
Solaflex (1930), Ltd., 12, Grosvenor Gardens, S.W.1.
Splendor Lamp Co., Ltd., Lombard Rd., Morden Rd., S.W.19.
Strand Electric & Engineering Co., Ltd., 24, Floral St., W.C.2.
Straight-Lite Reflectors, Ltd., 73a, Canonbury Rd., N.1.
Tannoy Products, Canterbury Grove, S.E.27.
T.B.T. Electric Co., Ltd., 171, Queen Victoria St., E.C.4.
T.M.C.-Harwell (Sales), Ltd., 233, Shaftesbury Av., W.C.2.
Trix Electrical Co. (Guy R. Fountain), Ltd., Canterbury Grove, S.E.27.
Tubelight Sales, Ltd., 24, Euston Buildings, George St., N.W.1.
Tungstalite, Ltd., 47, Farringdon Rd., E.C.1.
Walter, D., & Co., Ltd., 61-63, Lant St., S.E.1.
Ward & Goldstone, Ltd., Frederick Rd., Pendleton, Manchester.
Wardle Engineering Co., Ltd., Old Trafford, Manchester.
Western Electric Co., Ltd., Bush House, Aldwych, W.C.2.
Whiteway Lighting, Ltd., 22, Bruton St., Berkeley Sq., W.1.
Youngsigns, Ltd., Brent Cross Works, North Circular Rd., N.W.2
Zeiss Ikon, Ltd., Mortimer House, Mortimer St., W.1.

Public Address Equipment

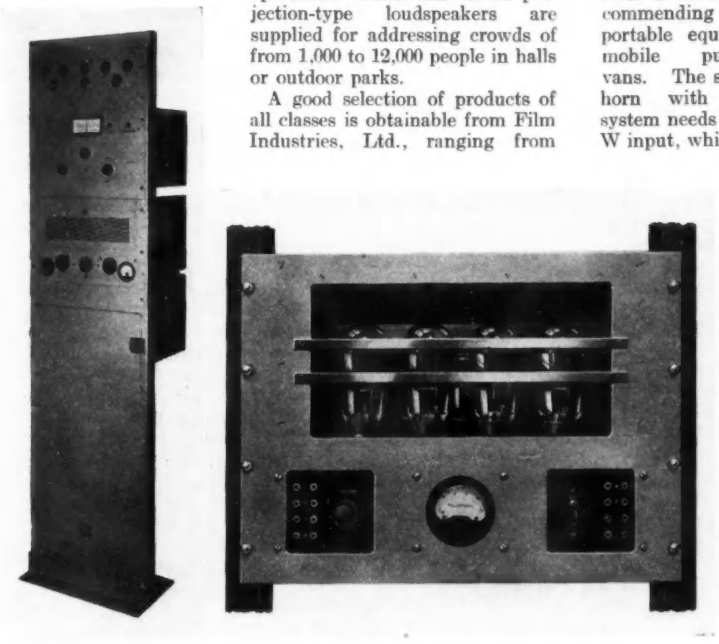
A variety of types suitable for Coronation requirements

NO occasion is more likely to demonstrate the effectiveness of public-address equipment than the Coronation celebrations.

A pioneer in the commercial production of such apparatus is the Marconiphone Co., Ltd. Apart from rack-mounted gear, this company supplies a portable battery-energised outfit assembled in carrying cases with non-interchangeable plug connectors. Self-contained demonstration sets are portable and can be operated by a convertor driven by a 24-V car battery or fed from the mains. The microphone is of small dimensions and can be fixed to a stand or pinned on to the user's coat.

The keynote of the "Coronation" outfit offered by the Ardente Acoustic Laboratories (R. H. Dent, Ltd.) is simplicity of operation. It is supplied complete for relaying ceremonies that may be broadcast, and also enables radio and gramophone music to be interspersed with speech magnification. In addition to a moving-coil microphone on an adjustable table stand or folding floor pedestal there is a separate wireless tuner for medium and long wavebands. Either or both may be simply plugged-in to a third component, consisting of an all-electric gramophone with associated amplifier combined within a carrying case with hinged lid, and arranged for a.c. or d.c. mains operation. From one to six projection-type loudspeakers are supplied for addressing crowds of from 1,000 to 12,000 people in halls or outdoor parks.

A good selection of products of all classes is obtainable from Film Industries, Ltd., ranging from large outputs down to a few watts, such as the "Westminster" combination, which can be housed entirely in a car with the horn speaker accommodated under the bonnet of the vehicle and a small microphone upon the steering wheel.



Front view of complete rack and panel type sound amplifier (B.T.H.), and right, a typical 100-W amplifier panel (G.E.C.)

Mobile Reproduction Apparatus

The name of Mobile Amplifiers, Ltd., is indicative of the type of equipment offered by this firm, while the variety of models available from Philips Industrial (Philips Lamps, Ltd.) includes a van installation. The mobile unit produced by Shaftesbury Microphones, Ltd., is operated from a 6-V car battery and embodies a small rotary convertor for energising the valve anode circuits. This firm also builds a universal mains model in three-unit form, all the sections being arranged to pack within the speaker flare.

The range of sound-reproducing apparatus manufactured by the General Electric Co., Ltd., is claimed to include equipment for every class of microphone, gramophone and radio amplification, either indoors or out, for battery energisation or mains operation.

Microphones are available of the moving-coil and transverse-current carbon types for mounting on adjustable table and floor stands, telescopic tripods, or wall brackets. The "lapel" microphone is so small (1.75 by 1.5 by 0.75 in. overall and weighing 1 oz.) that it may be clipped in a buttonhole or pinned to the speaker's clothing.

There is a portable self-contained outfit, with batteries, in an oak carrying case, weighing 27 lb., providing three stages of amplification for a Class "B" output of 1.25 W (a.c.). Another set in an oak carrying case, weighing 22.5 lb., is designed for operation entirely from the 12-V lighting system of a motor car.

The junior universal equipment can be used without adjustment on d.c.-a.c. mains between 200 and 250 V, with the three-stage amplifier, contained in a carrying case weighing 33.5 lb. Other transportable box models weigh up to 53 lb., providing 6- or 14-W outputs with a.c. mains inputs of 74 and 125 VA, similar to the chassis models and panels supplied ready for mounting on standard rack frames. These employ "Osram" triode valves throughout and resistance-capacity transformer coupling.

Cabinet instruments for hospitals and institutions, with 6- and 12-W outputs, enable 100 headphones or from one to three loudspeakers to be fed from an output of 1 W; large speakers need a minimum of 2 W each. The 5-W exponential horn will function down to 2 W, thus commending itself for portable equipments and mobile public-address vans. The semi-projector horn with moving-coil system needs from 5 to 10 W input, while the mains-energised projector will carry up to 30 W, its field coil taking up to 36 W.

Public address microphone (Western Electric Co.)

A mains-excited moving-coil cone speaker capable of handling 20 W down to 2 W is available in chassis and cabinet forms. There is a permanent-magnet moving-coil speaker rated at 1 to 6 W in a cabinet or fitted in steel-drum container for office buildings, factories, shops, and warehouses. A portable theatre projector of p.m. type consists of a 104-in. horn "folded" into a wooden cabinet.

The British Thomson-Houston Co., Ltd., is specialising in the larger type of installations necessitating substantial power outputs, intricate control arrangements, and careful matching of components. Its latest achievement is the production of an output amplifier that employs a special circuit of Class AB amplification, giving 120-W acoustic power output for 5 per cent. total harmonic distortion, while the steady consumption from the mains is only 500 W. This unit requires a separate rectifier.

Another development is a metal-diaphragm speaker which, while maintaining a far greater efficiency than the moving-coil cone-type speaker, possesses a remarkably good frequency characteristic, and at the same time is suitable for dealing with 10 to 15 W output. The introduction of a volume expander in the amplifier, where required, imparts "life" to the relay of music. There are also available 10- and 30-W portable amplifiers for use with gramophone, microphone, or radio input; various types of microphones for different requirements; and a wide range of speakers.

Combined electric gramophone and amplifier of the Ardente "Coronation" outfit

The Trix Electrical Co., Ltd., has experience of outdoor theatre work, necessitating the employment of numerous concealed microphones, as well as of stadium and indoor amplification.

Instrument Improvements. By G. F. Shotter, A.M.I.E.E.

As shown at the Physical Society's Exhibition

THE annual exhibition of the Physical Society once again provided an occasion of social interest and scientific importance. One impression gained this year was that the curtailing of some of the space provided in previous years tended to cramp exhibitors, particularly those represented in the Industrial Section. In my opinion this exhibition is far too important to be restricted in any way, because most of the members and visitors regard the event not only as a means of viewing progress made, but also as an opportunity to converse with friends or acquaintances whom they do not often meet. Any discomfort, therefore, tends to defeat both objects. The exhibits were so varied and numerous, all having their own particular points of interest, that it has been difficult to select the most important because the general trend of progress is represented by improvements to existing designs. A noticeable feature in this connection was the increased degree of efficiency in some of the instruments for low range measurements.

Oscillographs

Among the cathode-ray oscillographs shown was a three-element Cambridge instrument designed primarily to record medium-speed phenomena on a rotating drum or continuous film camera. It employs an entirely electrical exposure method which enables the equipment to record both controlled and uncontrolled transients. In the first case, an external circuit is closed to initiate the transient, and in the second the oscillograph itself is operated by the phenomena under investigation. Direct observation on the oscillograph screens or photography of all phenomena viewed is possible. The equipment is also designed to include an external time base unit for the recording of transients of short duration and recurring phenomena of high frequency. It may incorporate a time marker which gives exceptionally sharply defined marks at intervals of 1/50 to 1/10,000 second. Another accessory consists of a mains-driven amplifier with a sensibly level frequency response from 10 cycles to 50 kilocycles per second, giving an earth-balanced output with a full-scale deflection for a minimum input of 0.2 r.m.s.

Rotating drum cameras, continuous film cameras, and plate holders permitting the use of a single plate for three separate sets of records can be provided. The oscillograph elements consist of high vacuum (electron focused) heavy duty tubes with highly actinic screens, the electrons between the filament and the third anode being accelerated by a potential of 5,000 V. The tubes are capable of passing 200 microamperes in the beam.

Another interesting oscillograph for the observation and recording of high-speed transients was an instrument shown by Standard Telephones & Cables, Ltd. This consists of two parts, a tube unit and a mains unit, each separately portable, which eliminate the necessity of wiring between them and achieve safety of operation by being arranged to plug into each other back to back. In operation, the incoming transient breaks down a pre-set spark gap, which causes the cathode-ray spot to appear on the screen and to sweep across in a time controllable between a microsecond and a millisecond with a time lag of a fraction of a microsecond, suitable timing waves afterwards being applied for comparison. A high-vacuum tube is used with anode voltages up to 5,000 V. A feature for providing permanent records is a special camera which is arranged to clip on to the front of the tube unit. This instrument should prove useful for surge testing of transformers, cable testing and surges on power lines, &c.

This company also exhibited a general purpose self-contained cathode-ray oscillograph employing a gas-focused tube and incorporating a linear time base suitable for viewing waves over a frequency range of 15 to 15,000 c.p.s. Provision is made for the tube to be used without the time base and in addition to all the normal facilities "X" and "Y" shift controls for the spot are provided. The time marker attachment supplied for use with cathode-ray film cameras consists of a reed-operated shutter interrupting the light from a small lamp, 1/50 or 1/100 second time marks being recorded.

Two types of cathode-ray oscillographs for general purpose recording work were exhibited by A. C. Cossor Ltd. A particular feature of these is that they enable the beam to be turned on and off very rapidly either by a mechanical contact or by a negative pulse. Mention must also be made of a complete range of cathode-ray tubes of improved design shown by the Edison Swan Co. This included a high-voltage hot-cathode high vacuum sealed-off tube to operate at pressures up to 15 kV.

Generally, the progress made with this type of apparatus consists of improvements in their efficiency.

Indicating and Recording

An interesting exhibit shown by Elliott Bros. consisted of a 30-in. circular dial indicator giving a scale length of 60 in. This instrument is of the permanent-magnet, moving-coil type and is of very high sensitivity. It gives a full-scale deflection with 1 milliampere, the coil resistance being approximately 1,000 ohms. A 36-in. dial indicator is also available, having a scale length of 72 in., but of slightly lower sensitivity. This company also showed a specially high sensitive d.c. recording instrument of the permanent-magnet, moving-coil type. It gives a full-scale deflection for 1 milliampere and has a volt-ampere consumption of 1.1 milliwatts, the torque for this consumption being 17 grm.-cm. The movement is magnetically self damped and quick acting. Another addition to this company's range is a portable a.c. test set known as a "Weameter" for the measurement of volts, amps. and watts on a single instrument. It is of the iron cored dynamometer pattern and has a self-contained voltage range up to 270 V and a self-contained current range of 0.5 or 5 A. In the former case it is particularly suitable for operation with a multi-range miniature transformer which can be incorporated in the cover.

Engineers are familiar with the carry-over feature which has been employed to overcome the possibility of supply failure in time switches operated by a synchronous drive, but Everett, Edgcumbe showed an ingenious application of this feature in one of their recorders. It consists of a normal chart-driving mechanism which is electrically wound by a synchronous motor, an escapement being continuously regulated to agree precisely with the speed of the motor. An advantage of this arrangement is that should the a.c. supply fail the clock will continue to drive the chart while the regulator is correctly set for exact timekeeping. Incidentally, the seven-day reserve provided should allow ample time for any normal supply company to restore its service. Everett, Edgcumbe also exhibited a direct-reading leakage indicator (due to Messrs. Stubbings and Quenzer) by means of which the combined insulation of a direct-current system such as that of a trolley-bus can be measured directly on the scale of the instrument.

In connection with heat economy and control apparatus, Elliot Bros. showed a combustion heat loss recorder. This particular instrument allows for the variations of flue gas temperatures which are not taken into account in the normal CO_2 instrument.

It is pleasing to note that some new rectifier-operated milliameters and millivoltmeters have been developed for low range measurements. One exhibited by Everett, Edgcumbe makes use of a nickel-iron step-up transformer of high efficiency, the instrument being obtainable in ranges of 0-20, 0-100, and 0-500 millivolts with a consumption of approximately 100 mA. Other instruments of this type were also shown by Elliott Bros. with ranges as low as 0-10 mV and 0-10 mA, having negligible fre-

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Public Address Equipment (*Continued from preceding page*)

Its larger amplifiers are rack mounted, but portable sets are also made for mains operation, with automatic voltage control, in addition to models which can be worked off a 6- or 12-V car battery.

Tannoy Products (Guy R. Fountain, Ltd.) specialise in the rack system and to some extent in fair ground equipment also, supplying amplifiers for outputs of from 10 W to 1 kW. One set is made to work off a.c. mains, d.c., or a car accumulator.

Apart from one or two specially planned open-air systems for the reproduction of music the Western Electric Co., Ltd., confines its public-address activities to the reinforcement of stage shows in theatres. In these cases opportunity is taken to use the film-sound amplifier outfit, which would otherwise be idle during a stage performance, in conjunction with microphones installed on the stage, means of control ("mixer") in a representative position in the auditorium and special loudspeakers placed behind grilles in, or adjacent to, the proscenium arch. If a microphone is required in a cinema theatre solely for making announcements, comparatively simple equipment is provided which is entirely controlled from the projection booth. For announcing purposes the main talking film loudspeakers can be employed in most cases.

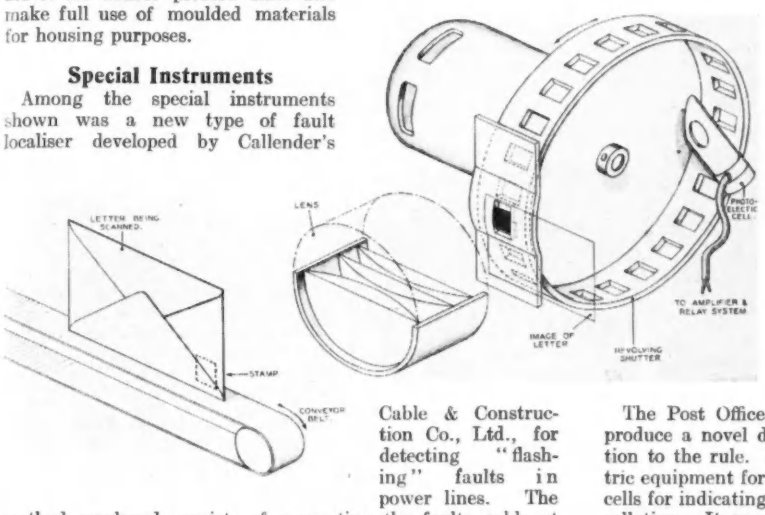
It should be remembered that all reproduction apparatus (whether acoustic, radio, or electric gramophone) operated by energy derived from public or private mains is subject to the safety precautions delineated in British Standard Specification No. 415—1936, which details the requirements both for the design and construction of such equipment and for its electrical performance.

quency and temperature errors and a scale shape that is almost linear. They are suitable for all frequencies up to and including the audio-frequency band.

The Weston Instrument Co. exhibited a new range of portable d.c. microammeters with a full-scale deflection of 5 microamperes and with a 5½-in. scale length. These instruments are of the double pivoted class and make full use of moulded materials for housing purposes.

Special Instruments

Among the special instruments shown was a new type of fault localiser developed by Callender's Cable & Construction Co., Ltd., for detecting "flashing" faults in power lines. The method employed consists of connecting the faulty cable at both ends to a good cable and charging up with d.c. by means of a "Kenotron," or similar apparatus, until the breakdown voltage is reached. The currents which flow to earth on "flashover" are passed through two of these fault locators, one of which is connected at either end of the faulty cable. It has been my experience that this type of fault is very difficult to locate and some more information regarding the accuracy of the apparatus might be found helpful.



A novel application of the photo-electric cell was demonstrated in an instrument shown by Everett, Edgcumbe. This is used as a transfer instrument for checking an ammeter at radio frequency. The current to be measured is used to incandesce a filament, its degree of incandescence being measured by a photo-electric cell, and, consequently, as this degree of incandescence can be reproduced by direct current or low-frequency alternating current, the actual value of the radio-frequency current can be ascertained.

A new development in potentiometers incorporating automatic balance by means of photo-electric cells is described by the Weston Electrical Instrument Co. The potentiometer method used is the so-called "alternative" or "second" method in which a variable indicating current is passed through a fixed resistance, the drop across which is opposed to the unknown e.m.f. A moving-coil mirror galvanometer in the balance circuit is used for detection. The galvanometer is arranged to deflect a beam of light on to two photo cells which in turn control the grid of a valve. With suitable auxiliary apparatus instantaneous automatic balance is obtained. Measurements as low as 2 millivolts or 5 microamperes can be made by this means. There are no moving parts and the instrument operates directly from a.c. mains at commercial frequencies.

A further application of the Evershed-Midworth telemeter system which was demonstrated last year is its use for two-way signalling. Two pilot wires only are used, the accuracy of the system is fundamentally independent of the resistance of the line and, in addition, a large number of signals can be transmitted with accuracy.

Research Section

In my opinion one of the most interesting exhibits in the Research Section was the work by Prof. G. I. Finch, Dr. H. Wilman, and Dr. S. Fordham, showing the recent advances in the technique and application of electron diffraction, particularly their researches by the use of this method in connection with the formation of the Bulby polish layer. The study of this phenomenon is not only of the utmost importance to light and heavy engineering, but also has its applications to meter engineering in conection with bearing systems and clockwork mechanisms.

The Post Office Research Department usually manages to produce a novel development and this year proved no exception to the rule. The apparatus shown consists of photo-electric equipment for examining surfaces and makes use of photo-cells for indicating stamps on letters in correct position for cancellation. It may also be used for discriminating between stamps of different colours. Light from two parts of the surface is caused to fall alternately on the photo-cell *via* a revolving shutter. If the two parts differ in illumination a.c. is generated in the photo-cell circuit. The current is amplified in an amplifier tuned to the shutter frequency and can be used to operate mechanical devices for separating or arranging letters. The amplifier can be biased to ignore input below a specified value. This feature may be used to discriminate between certain stamps and to neglect the effect of irregularities of the letter surface. This apparatus will deal with 1,000 letters per minute. It only remains for these ingenious engineers to be persuaded to produce apparatus to completely annihilate a certain type of envelope with which most of us are only too familiar!

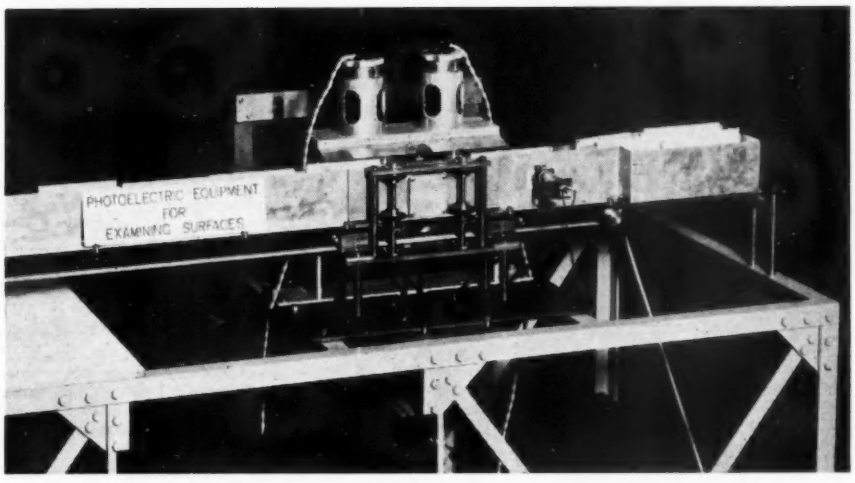


Photo-electric apparatus for examining stamps on letters. The system is shown diagrammatically above

In conclusion, reference must be made to the high-class workmanship shown in the section devoted to apprentices and learners.

Institution of Television Engineers

THE Institution of Television Engineers, Ltd., was registered on January 2nd as a company limited by guarantee without share capital. Each member is liable for £1 in the event of winding up. Its objects are to advance the art and science of radio communication through the presentation and publication of technical papers, by affording its members opportunities to meet and discuss radio and television problems, and by the award of honours and prizes; and to amalgamate with the Institution of Television Engineers, Ltd., the Institute of Radio Engineers, Ltd., and the Institution of Radio and Television Engineers formed for radio and television research and communications, &c. The subscribers are: F. Edwards, 1, Rectory Terrace, New Hampton Road East, Wolverhampton; J. W. Graham, 14, Kirkgate, Perth; C. S. Butler, Glenfern, Alexandra Road, Kings Hill, Wednesbury; E. R. Mitchell, Aurora, Woodsetton, near Dudley; H. N. Griffiths, 29, Himley Road, Lower Gornal; R. W. Upton, 4, Albion Street, Rugeley; and M. Schriemer, 20, Meridale Lane, Wolverhampton. The management is to be vested in a council numbering not fewer than three nor more than six members. The subscribers are to appoint the first. The secretary of the new institution is F. Edwards.

New Apparatus and Devices

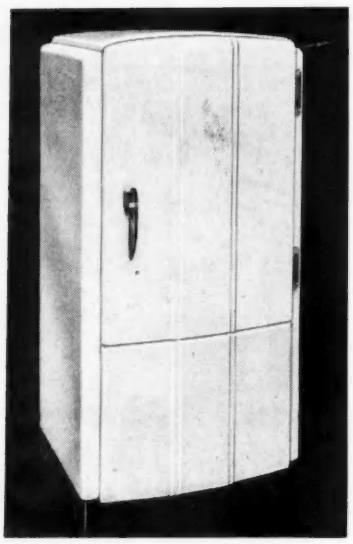
for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Redesigned Testing Instruments

A range of apparatus for use at communication frequencies is made by MUIRHEAD & Co., LTD., Elmers End, Beckenham, Kent. In addition, the general adoption of these frequencies for electrical testing has necessitated the redesign of older types of instruments. For instance, the thermionic voltmeter introduced last year is now available for mains as well as battery operation in portable form or assembled on a panel for rack mounting. The input impedance has been increased (2 megohms at 160 kc.p.s.) and the input capacity reduced to 9$\mu\mu$F. The scale is linear above 0.2 V, and the battery models have two ranges of 0 to 2 and 0 to 10 V, while the mains operated instruments have three ranges of 0 to 2, 0 to 10, and 0 to 50 V.

A Wheatstone bridge arranged as a complete testing set, including galvanometer, battery, and the necessary keys, and switches, can be used for making loop tests as well as ordinary resistance measurements. A three-position key switch alters the internal connections so that the set may be used as a normal Wheatstone bridge and also for fault location, using either the Murray or Varley loop tests. The galvanometer is of a sensitive moving-coil pattern with a zero setting device. A further three-position key switch enables the galvanometer to be either shorted, shunted or unshunted; shorting provides damping to make it safe for transport.

The portable form of Muirhead thermionic voltmeter which has recently been improved



The B.T.H. "FT50" refrigerator

New Refrigerator

Special features are incorporated in the design of the new B.T.H. "FT50" refrigerator of the INTERNATIONAL REFRIGERATOR CO., LTD., 169, Regent Street, London, W.1. Last week the company held its fourth annual convention, and following the business meeting dealing with the new year's programme of advertising and sales promotion and a banquet at the May Fair Hotel, the guests were shown the new model.

Instead of the unit being on the top of the cabinet it is housed in the base; however, the same type of hermetically-sealed unit is employed and is guaranteed for five years. The capacity is 5 cu. ft. and nine-point cooling is provided. The evaporator is of stainless steel, the cabinet having a porcelain lined interior, stainless steel construction being employed throughout. The door is provided with a lock and hinge and the external appearance has been considerably improved compared with the older models.

Recent Weston Instruments

Among the newer products offered by the WESTON ELECTRICAL INSTRUMENT CO., LTD., Kingston By-pass, Surbiton, Surrey, is a photo-electric potentiometer combined with an electronic balancing system which operates a galvanometer under conditions which permit a high degree of sensitivity. This instrument can be supplied for photo-electric measurements of either voltage or current of 2 mV or 5 mA full scale. The respective sensitivities are of the order of 10^{-5} V and 2×10^{-9} A.

When a relay type of control is desired a device is available for use in conjunction with the potentiometer which is capable of operating within $\frac{1}{4}$ per cent. of full scale.

Also, there is a new range of instruments especially adaptable to the accurate measurement of very small currents, such as are encountered in telephony, temperature measurements, and experimental and development laboratories. They are of a double pivoted type having full scale lengths of over 6 in. for sensitivities as low as 5 mA, and they are also available as millivoltmeters and pyro-millivoltmeters.

For "Photronic" measurements an important new development is a visual correction filter which, when utilised in conjunction with the cell, enables an over-all response characteristic to be obtained closely approximating to that of the average human eye. This development is of special importance, as illumination instruments can now be used with all classes of light, whether tungsten, continuous, or monochromatic, without a correction factor.

Sullivan Instruments

An example of advancement in instrument design announced by H. W. SULLIVAN, LTD., Leo Street, Peckham, London, S.E.15, is a wavemeter with a range from 100 to 30,000 kc.p.s. and an accuracy of one part in 10,000 with a stability of two parts in 10^6. It is an improved sub-standard model of simple screened form and continuously variable generator type. The great accuracy is due to the use of improved stable inductance standards and a novel dual range variable condenser which combines the important features of linearity of frequency law and range extension. The first provides arithmetic interpolation with great exactness (0.005 per cent.) and the second much increased accuracy, both actual and reading (0.003 per cent.). Oscillation is on the dynatron principle and the calibration is independent of valve replacement, while direct-reading frequency scales of an accuracy of 0.015 per cent. are fitted.

Another example is a logarithmic bridge capable of a very wide range of a.c. capacitance measurements, from 1$\mu\mu$F to 200μF. Its accuracy is within 0.2 per cent. with a scale accuracy of 0.1 per cent. uniformly throughout. This bridge is direct reading and balance is obtainable by visual or aural detection. It can be operated from the mains or battery.

A Lift Sign

A sign for use at the entrance to lifts has been introduced by LINOLITE, LTD., 96, Victoria Street, London, S.W.1. This is obtainable in both single and double sided models and throws a light on the threshold of the lift, reducing the risk of accidents. It is finished in toned bronze, and is supplied complete with wall bracket.

Flash Tester

For flash-testing all electrical windings RUNBAKEN ELECTRICAL PRODUCTS, 280, Deansgate, Manchester, 3, have introduced the "Flash Test," which can be supplied to operate on any a.c. system. A change-over switch enables 1,000-V or 2,000-V tests to be made.

The Sullivan logarithmic capacitance bridge, and (inset) the scale reading

Meetings and Discussions

The production and application of high-permeability nickel-iron alloys were treated by Mr. W. F. Randall in a paper read before the Meter and Instrument Section of the I.E.E. last week. Mr. J. A. B. Horsley, Chief Electrical Inspector of Mines, contributed his views to the discussion on a paper on flameproof motor developments read before the A.M.E.E. last week by Mr. M. G. R. Elliott. The Transmission Section of the I.E.E. heard a paper by Mr. J. Eccles on equipment for urban distribution systems on Wednesday last; the author paid particular attention to safety with economy

Alloys for Instruments

THE commercial development of nickel-iron alloys of high permeability, particularly "Mumetal," is summarised in a paper by Mr. W. F. Randall (Telegraph Construction and Maintenance Co., Ltd.), which was read before the Meter and Instrument Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on January 8th.

The difficulties encountered during manufacture, and the precautions necessary in these metallurgical processes, are described. Stress is laid on the correct methods of application to ensure that the magnetic properties of the alloys are utilised to full advantage, and the need for heat treatment is emphasised. Propositions are put forward to explain the mechanism of this heat-treatment process, and the practical procedure is given, while the electrical and magnetic properties of these alloys are stated.

The paper concludes with examples of practical applications, such as to submarine telegraph cable loading, increasing the message capacity from five to ten times; to instrument-transformer cores, much reducing weight, phase-angle and ratio errors; to radio transformers and chokes, with large savings in weight and winding cost and minimising vibration noise; to magnetic screening, from ten to twenty times more effective than ordinary iron of equal thickness; to magnetic relays, markedly more responsive, reducing pick-up and release currents, increasing the on/off current ratio by nearly 20 per cent. and less subject to atmospheric oxidation; and to the construction of armatures for moving-iron meters, so making their accuracy comparable with that of moving-coil instruments.

Flameproof Motors

AT a meeting of the London Branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS on January 5th a paper was read by Mr. M. G. R. Elliott (Lancashire Dynamo & Crypto, Ltd.) on "Recent Developments in Flameproof Electric Motors." Broadly speaking, he said, these had increased the range of horse-power, speed and variety of types available; improved structural details to facilitate installation handling and maintenance; and had made the motors suitable for a greater variety of inflammable atmospheres. Certified flameproof motors were available to-day for both a.c. and d.c. from ¼ h.p. for roadside petrol pumps to motors of over 100 h.p. Actually, there was not much demand at present for very large flameproof motors. In collieries it was seldom that a motor of over 100 h.p. was required to be completely flameproof. For such duties as main pumping and haulage, owing to the fact that these plants were situated near pit bottom, it was sufficient to use open-type motors with flameproof slip-ring covers.

Typical types were described by the author, special reference being made to the a.c. "Fankuld" type. He said it was made from 1 to 130 h.p. with wound rotors and to 175 h.p. squirrel cage. It provided a greater output for a given diameter and length, but was made of cast-iron, whereas the all-steel squirrel-cage barrel type was more able to withstand rough handling and falls of roof; bolted feet were removable to enable the motor to be rolled along the ground.

Instrument alloys
Mine motor improvements
Urban network design

For outputs between 25 and 50 h.p. d.c. motors might be built on the enclosed air circuit principle, with an inside circulating fan and an outside flameproof radiator cooled by an external fan. Constructional details of plug connectors, terminal boxes, slip-ring and brushgear enclosures, bearings and shaft glands, were referred to. The Mines Department did not favour the use of pressure-relief devices, he said, but large motors needed some provision for dealing with the moisture which collected inside them. A combined drain plug and breather had been designed and tested at Buxton which, when suitably dimensioned, was safe and flameproof; it allowed liquid to be forced out with a temperature rise of about 10 deg. F. inside the machine.

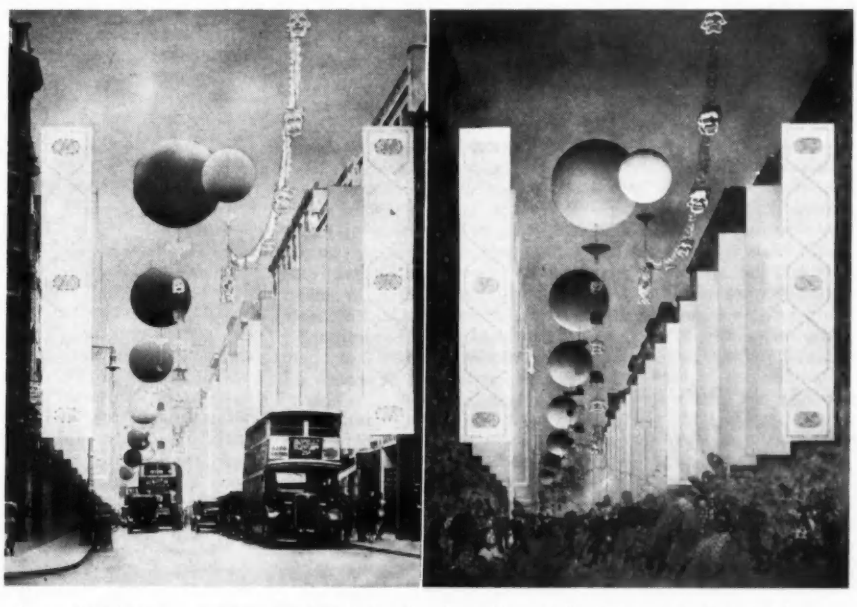
After presenting the paper, Mr. Elliott illustrated a "Corcooled" s.c.r. motor with stator cooling tubes and rotor ventilating holes. A fan inside the motor blew air through the tubes surrounding the motor and an external fan blew air over the tubes and, still more important, over the back of the core. The rotor was provided with a number of holes through which air was circulated.

Mr. J. A. B. Horsley, in a written contribution to the discussion, suggested that although the barrel type of construction, comprising a cylinder of sheet steel with a longitudinal welded seam and flat sheet steel end plates might be popular, it appeared to lack the rigidity of the older type of construction embodying elliptical sections, both for the frame and for the ends, which carried the bearings. It remained to be seen whether the newer style would give equally satisfactory service under mining conditions.

With regard to the author's statement that the end cover screws need not be recessed in order to satisfy the Mines Department's requirements, Mr. Horsley pointed out that if the heads of those screws projected, unshielded and unshrouded, beyond the surface of the end cover they were liable to damage under the rough conditions existing near the coal face; therefore, that type of construction was of dubious merit. Flimsy shrouds, such as thin pressed steel cups spot-welded to the cover, afforded no real protection. In a modern coal-cutting machine and in some modern types of conveyor heads there were no projecting screw heads. That was the ideal to be aimed at in designing plant for use at or near the coal face in mines.

The use of venting devices was not excluded by the terms of the Mines Department's specification for flameproof enclosures if, in fact, they were necessary. Inasmuch as Mr. Horsley had suggested the design of the drain plug ascribed in the paper to the Consett Iron Co., he was interested to hear that it served the purpose for which it was proposed.

Mr. D. B. Hoseason suggested that the author was wrong in his view that the Mines Department did not encourage bayonet-type slip-ring covers. If parts of a machine were to be properly maintained they should be readily accessible. The important feature of the bayonet-type slip-ring cover was that



Day and night aspects of another design for the decoration of Bond Street during the Coronation period. (See Mr. H. T. Young's article on page 79.)

the electrician could unlock a padlock and, with a single 30 deg. movement, remove the cover and inspect the slip-rings, then replace the cover, the whole inspection being completed in perhaps four minutes. One wondered whether, at a spot probably 1¼ miles inbye where there was plenty of water, the underground electrician would remove 24 bolts as frequently as the slip-ring gear ought to be inspected. He supported the author's remarks on the importance of the cartridge-type bearing housing, and suggested that it might be applied to all electric motors, whether in collieries or in steel, cement or other works. He doubted the advisability of providing air passages in motors used below ground. Air was blown not only through the tubes but also over the backs of the tubes, and dust from the atmosphere would perhaps accumulate on the backs of the tubes.

In reply to Mr. J. W. Wilkinson, who pointed out that only cast-iron slip-ring covers were ribbed to assist cooling, Mr. Elliott replied that the sheet steel covers were very thin and did not offer the same resistance to heat radiation. Their average thickness was from 0.08 to 0.1 in.

Mr. H. F. Buxton commented on the difficulty of obtaining small starters of between 1 and 15 h.p., and said that the difference between the prices of flameproof and standard starters was far greater than the difference between the prices of flameproof and standard motors.

Views on Urban Distribution

WHAT are the safest ratings and most economical dispositions of apparatus on the supply side of urban networks operating at or below 11 kV? An attempt to answer these questions is made in the paper by Mr. J. Eccles (Edinburgh Corporation) read before the Transmission Section of the INSTITUTION OF ELECTRICAL ENGINEERS on January 13th.

The first portion is devoted to a quantitative discussion on circuit-breaker duty and short-circuit phenomena. Some effects of interconnected working are indicated and means of current limitation and alternative methods of control under fault conditions are described. Having indicated that the practical (or economic) limit to the reduction of short-circuit current has been reached, the author next directs attention toward switchgear layout, stating what he considers to be the minimum requirements for reasonable safety in new layouts.

To those who may be labouring under the practical limitations of existing layouts, these recommendations may represent an impossible ideal, yet even in such cases, the author says, some improvement may often be effected by carrying out the simpler and less expensive suggestions. The accumulating experience in this and other countries seems to show that, where sectionalising cannot be carried out, all large urban networks should be provided with not fewer than two points of supply. Such points may normally be interconnected through an e.h.v. system, but each must be capable of providing at least a partial supply to the whole network when the other, with its associated energy source, is out of action.

Four different group-controlled feeder schemes, employing current-limiting reactors, are described and their relative costs compared. A fifth method consists in providing a circuit-breaker (f.c.b.) of relatively low rupturing capacity for each feeder, and so arranging the layout that groups of three of these units are supplied from the main busbars through a master circuit-breaker (m.c.b.) capable of making and breaking the short-circuit current at the point of supply. The control gear for such an equipment might be so arranged that, on the occurrence of a fault on any feeder of a group, the m.c.b. opens first, followed immediately by the opening of the f.c.b. on the faulty feeder; thereafter the m.c.b. automatically recloses.

The switchgear cost for such a group control scheme is substantially less than that of providing a separate high-rupturing-capacity circuit-breaker for each feeder. In a particular case in which five m.c.b.'s of 1,500 mVA rupturing capacity and fifteen f.c.b.'s of 350 mVA nominal rupturing capacity were installed, the cost was 55 per cent. of that of an alternative installation, employing fifteen 1,500-mVA breakers. Against this financial advantage there is a sacrifice of some of the flexibility of unit control, and the network must be designed to withstand the momentary loss of two healthy feeders.

The division of high-voltage networks into radial sections, normally completely separated except at the point of supply, would seem to be the safest and most practicable manner of reducing the short-circuit current at sub-stations, and hence of controlling the cost of sub-station switchgear. Short tie lines, normally open at one end, provided between sections would render mutual assistance under emergency conditions, such as the loss of a main feeder in either section.

The author has no doubt whatever that for main feeders and important interconnectors in urban networks the only completely satisfactory form of protection is the balanced-current system, with or without pilot wires. Objection is sometimes raised to systems involving pilot wires on the score of cost. On a recent extension, including six main feeders, each about 7,000 yds. long with switchgear at either end, the cost of the balanced-current protective equipment, including relays, current transformers, and pilots, was 4.75 per cent. of the cost of the complete electrical equipment comprising switchgear and laid and jointed cables.

Mr. Eccles sees considerable merit in placing at least two transformers in each sub-station providing general three-phase 400/230 V distribution. He believes their sizes could be standardised at 1,000, 500, 250 and 100 kVA.

The operating feature which calls for most attention is noise emission. For some years past the author has specified a maximum flux density in the iron circuit of 11,000 lines per cm². Not only are these low-density designs demonstrably less noisy, but their magnetising current and iron loss are both sensibly reduced, with corresponding improvements in network voltage regulation and reduction in system maximum demand. The annual saving, due to reduced iron loss, is more than sufficient to defray interest and depreciation charges on the increased cost of the transformer.

With 400/230-V three-phase 50-cycle four-wire distribution a loading density of about 20,000 kVA per sq. mile would seem to be the maximum that can be accommodated in city streets. Wherever possible endeavours should be made to connect all concentrated blocks of load, *i.e.*, 50 kVA and over, directly to the high-voltage network.

The author does not subscribe to the view that elaborate methods and apparatus are necessary on well-designed urban a.c. networks, to preserve satisfactory voltage regulation. In the principle of bringing the high-voltage supply as near as possible to consumers' terminals he sees the solution of a number of distribution problems in congested areas. Not the least of its advantages is reduction of voltage variation, coupled with the offer to consumers of financial inducements to correct their power factors.

Lightning Strokes

THE paper in which Mr. B. L. Goodlet gives an account of lightning phenomena and their effects on overhead transmission lines (to which reference was made last week) was discussed at the INSTITUTION OF ELECTRICAL ENGINEERS in London on January 7th. The author used a quarter-million volt impulse generator and a small model of a transmission line to demonstrate how tower footings of low resistance prevent insulator flash-over when the line is struck by lightning. Also, he demonstrated how a spark discharge will cross a long gap earthed through a low resistance rather than a materially shorter gap earthed through a high resistance, thus showing that gap-width alone is not a measure of voltage magnitude.

Opening the discussion, Sir George Simpson remarked that since his Kelvin Lecture seven years ago theory had been modified by what engineers had done. To investigate the upper atmosphere balloons had been sent up to which were attached instruments carrying pole-finding paper for indicating the direction of the field and providing some estimate of its intensity. Of seventy balloons released fifty-six had been recovered and forty-seven provided really good records. These showed that all thunderclouds had a positive layer on top and a negative layer at the bottom; also that in the lower portions there were strong positive concentrations. These investigations, which were made from Kew Observatory, indicated that both the Wilson and Simpson theories might be in part correct, but the Wilson effect could not take place in the upper part of a cloud, which was cold and dry, consisting of ice crystals floating downward. In the lower parts of the cloud there was a breaking of drops which could cause separation of charge.

The paper was described by Mr. E. T. Norris as a combination of physics, mathematics and engineering very well co-ordinated. He said that the "leader" stroke discovery had not been of much use to engineers. What they desired to know was the magnitude of the current in the stroke. Average values were of little use; they needed to know the maximum and, also, how often the maximum was likely to occur. Dr. F. J. W. Whipple spoke of investigations being made at Kew into variation of potential gradients, the results being unexpected and sometimes paradoxical. Lightning could increase an unappreciable gradient three or four times and frequently caused reversal from positive to negative. Such effects were not confined to clouds. The charge sign on the underside changed continuously, about every five minutes, as generation proceeded and the cloud moved along.

Mr. R. A. Watson-Watt referred to his use of wireless methods of establishing the polarity of clouds in the upper atmosphere and revealing much other information as well, which did not remove nervousness regarding the proposed 1/50 microsecond wave impulse spark-over test mentioned by

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

New C.M.A. Cables

The interesting letter from Mr. E. H. Tawn in your issue of January 1st raises the question of the tests to be applied to the new and improved C.M.A. cables and generally takes the C.M.A. pronouncement as to the abandonment of "megohm" grading a good deal farther than it was intended to go.

While the practice of classifying cables in accordance with a stated insulation resistance has been abandoned, with general approval, values of insulation resistance for the new cables nevertheless continue to comply with the I.E.E. Wiring Regulations. These values will be so high that any installation comprising such cables will not have the least difficulty, so far as the cables are concerned, in complying with I.E.E. and any other Regulations as regards the insulation resistance of the complete installation.

Mr. Tawn's letter also raises the age-old controversy as to the relative values of pressure tests *versus* insulation-resistance tests on completed installations, but this, as Mr. Kipling used to say, "is another story." I think I am correct in saying that Mr. Sydney Evershed once likened the attack by pressure test to the savage method of "scalping" the enemy.

Certainly the C.M.A. is not in any way going to do anything to deprecate the well-established and, I believe, wholly satisfactory insulation-resistance test of a completed installation.

T. F. PURVES,
Director, Cable Makers' Association.

London, W.C.2, *January 8th.*

Tariffs

As tariffs are at present much in the electrical engineer's mind may I offer a suggestion. This is to have a fixed charge, depending on rateable value or floor area, and to divide it by the load factor of a house so that $£a/b = £c$—where a is the fixed charge, b the load factor per cent. of the house concerned, and c the cost of all electricity consumed by the householder. The cost of energy would thus vary with the load factor.

If some enterprising meter designing engineer could invent a load factor meter in one unit, the adoption of this form of tariff would be considerably facilitated. H. L. TAYLOR.

Market Drayton, *January 8th.*

Moisture in Switch Oil

During the past twelve months there have been quite a number of cases of failure of switchgear reported in the Press, and no doubt many more of less importance which have not been so mentioned. Discussions have followed as to the possible causes of such failures, but I have not noticed in any instance reference to the possibility of failures being due to the switch oil itself.

There is no doubt that when gear is filled every precaution is taken by reputable manufacturers to ensure that the highest quality oils are employed, and that filling takes place under the best possible conditions, but as it is impossible for oil to remain in an electrically dry state in ordinary service, and particularly in the case of switchgear installations where little or no heat is generated by the current passing through the switchgear, it appears to be imperative that such oil should be examined and replaced at regular intervals.

[*Elec. Rev.* photo.
Spraying lamps for the Coronation at the Beeantee works

There seems to be some doubt as to whether switch oils are examined and replaced regularly as a routine job, and although it is accepted as essential in the event of an oil switch operating on a severe fault that the carbonised oil be removed and replaced with clean oil, it may not be fully understood that the gradual deterioration of insulating oil, due to the absorption of moisture, may be the cause of bad failures on a system.

The period which can elapse before reconditioning becomes necessary must vary enormously with the situation of the gear; whether it is of the indoor or outdoor type, and whether any artificial heat is provided to maintain the temperature of the gear, and only periodic tests can determine when the necessity for reconditioning will arise.

I suggest, in fairness to the switchgear manufacturers and suppliers of the oil, that every installation should be examined once every six months and definitely not less frequently than once a year, for it has been found from actual investigations made on oil-filled gear which has been in service for long periods of time without the oil having been

Meetings and Discussions (*Continued from preceding page*)

Mr. Norris and which he (the speaker) shared. Wireless evidence, which engineers were thirteen years late in accepting as convincing, was available for the consideration of engineers before they decided upon impulse test specifications. In addition to the paper, the appendix on the propagation of long sparks and lightning flashes was of great value.

Mr. F. J. Scrase described the balloon recorders which had been sent up from Kew, remarking that fields of really high values were found one or two km. above the cloud base. Mr. J. F. Shipley, in opposition to the author, contended that thunderstorms did occur over deserts. He had experienced them himself when living in such districts. Such storms were capable of releasing enormous quantities of rain and might have been responsible for the denudation of certain barren parts of South America. In Nigeria he had watched, for hours at a time, flashes between clouds which never came down to earth. Rotating clouds, or "line squalls," that moved horizontally could also account for strokes that did not reach the ground.

Dr. E. H. Rayner mentioned the rapidity of recording that was necessary for lightning investigations, and suggested that old experiments might be repeated with cathode-ray oscillographs in place of the earlier electrometers used. Mr. K. J. R. Wilkinson considered it more reasonable to assume that "leader" strokes were non-conductors. He could not appreciate how discontinuities in the soil could determine the localisation of lightning.

Dr. J. L. Miller said that information on magnitude and rate of rise of current was very meagre and sometimes contradictory. The largest value attributed (in the U.S.A.) to a stroke was 220,000 A. There were travelling waves on transmission lines with steeper fronts than could be due to lightning strokes. They were possibly due to change of impedance; if the current could not change quickly the voltage would have to rise very steeply. Therefore very fast waves could be formed by slower lightning strokes.

Mr. W. M. Mordey spoke of the simple means used to protect overhead tramway conductors when horse trams were first converted. Mr. C. E. Maguire explained how sharp spikes on towers tended to reduce flashes to the line; even if the flash did not go to the spike its intensity would be reduced. A line protected in this way had remained unaffected while others nearby had suffered. He would go further and provide the overhead earth wire with barbs.

Mr. E. Kilburn Scott offered an explanation of ball lightning. Mr. J. R. Mortlock suggested equality of positive and negative discharges and therefore a combination of the two theories. Part of a cloud's charge might be released into the "leader" stroke; that, in turn, would release the "bound" charge from the earth, the two meeting in space.

Mr. Goodlet, in reply, said he regarded his paper as a target to be shot at, so that from its destruction some good might emerge. He had assumed the 1/50 microsecond impulse wave merely as an illustration. Engineers never experienced more than a portion of the effect of a whole discharge, and line records could not reveal much about a stroke because of the enormous distortion resulting from secondary effects. He was expecting some experimental records from a friend in Russia (if he were permitted to send them) which should be of considerable interest.

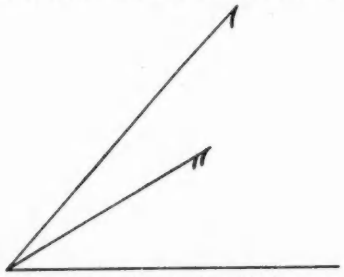
reconditioned that water has been located at the bottom of the tanks, indicating maximum "wetness" of oil.

The outcry which follows each large failure is not good for the industry, and I suggest many of them could be avoided by the employment of what might be described as elementary precautions, as referred to in this letter. F. E. MEW.

Wallington, *January 7th.*

The Extended Use of Arrows

Many years ago I tried, but without success, to interest one of our great scientists and teachers in the use of arrows with one barb to indicate rotating vectors. Vectors have come into much greater use since then and there may be more willingness to accept a simplification in their shape. There is also a precedent which counts for much in scientific circles, at any rate in matters of this kind. In his text book on the infinitesimal calculus Professor Carey refers to the beautiful suggestion of Dr. Mercer of single barbed arrows to denote "approximation to," and he makes free use of them in his book, dated 1920. It seems, therefore, that the earlier suggestion that they might be used to indicate rotating vectors may now be revived. The diagram shows one vector rotating counter-clockwise with one half barb and a second one rotating at twice the speed with two half barbs. If one desired to indicate rotation in the opposite direction the barbs would be placed on the opposite side.



There is a further use for arrows which would be a blessing to printers of mathematics and also to those who type mathematics. This consists in using arrows to bring involved indices on to the printing line. Taking a simple example,

$e^{h\frac{d}{dx}+k\frac{d}{dy}}$ would more easily be printed as $e\uparrow h\frac{d}{dx}+k\frac{d}{dy}$.

Also $x^{f(x)^{f(x)}}$ would be easier to print as $x\uparrow f(x)\Uparrow f(x)$

where the double barbs in the second arrow show that the second index is raised up a space further. These, of course, are simple examples, but more complicated instances are common in higher mathematics. C. TURNBULL.

Tynemouth, *January 5th.*

In Defence of the Tramways

May I, as one who signed the circular letter referred to in your leading columns, say that we were fully cognisant of the usual difficulties in connection with the operation of the average tramway where (in the outer areas) headway falls below a certain level, and also of the fact that capital outlay on subways is a heavy charge on the tramway system.

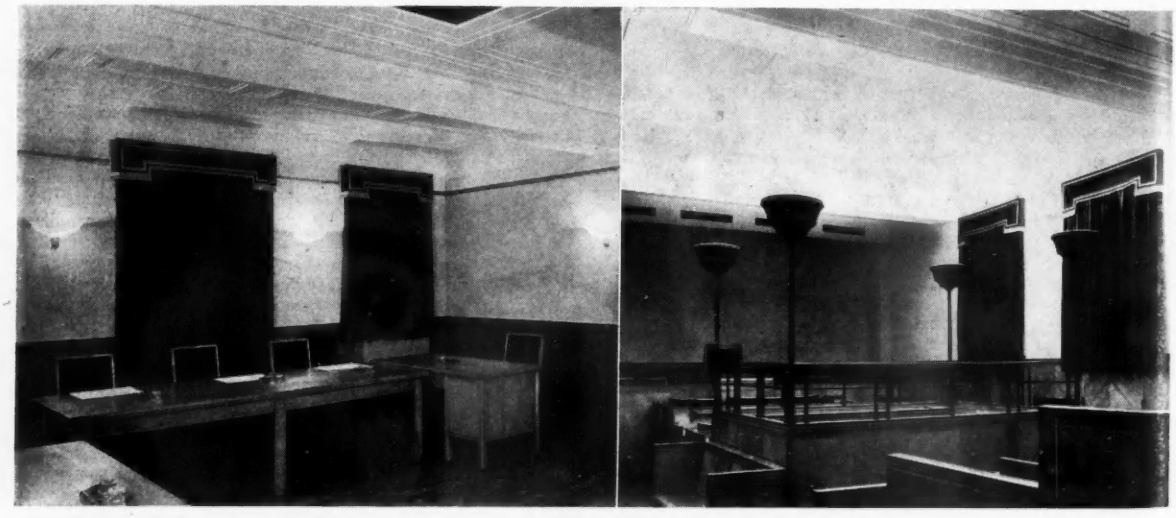
First, however, I would point out that, in general, those dealing with tramway statistics overlook the possibilities of development, and fail to base any calculations on reduced costs due to the use of sleeper-track, which is not only cheaper to construct, but cheaper to maintain. Then, our plan envisages the eventual creation (concurrent with town-planning) of high-speed light railways having as far as possible their own track, no matter whether in tunnel or on the surface. If we suppose a certain South London tram route now requires twenty-one cars to work it at a 5 min. headway, the average speed being 9½ m.p.h., then supposing trolley-buses could succeed in raising that average speed to 12 m.p.h., the number of trolley-buses required at the same headway would be seventeen—*but* in rush hours that number might have to be increased owing to the slightly lower capacity of these vehicles.

If trolley-buses could manage 12 m.p.h. under ordinary traffic conditions, obviously our high-speed light railways could operate at about 20 m.p.h., so that the number of cars required would drop to a mere eleven, which is very economical. Add to this the potentialities of trailer-car working and there appears a very definite economy of working during rush hours.

Effective Coronation illuminations can be arranged by outlining small buildings in neon tubing. This photograph shows an example: a garage on the Great West Road

The capital outlay on subways should, I suggest, be in part paid for by the State, as they would be used for public service and would undoubtedly prevent the necessity arising (at any rate in some measure) for construction of traffic tunnels, which, owing to their size, must naturally be far more expensive than tram subways. In addition, some of the developed tramways would render it unnecessary for the Transport Board to construct the tube railways that now appear necessary—a saving to the Board since it admits the extreme difficulty or impossibility of making tube railways pay. S. G. JACKMAN.

London, S.W.16, *January 5th.*



The new Bromley (Kent) Police Court has a most efficient lighting installation. The left-hand illustration shows the Best & Lloyd wall fittings in the Juvenile Court. The indirect fittings in the Main Courts (right-hand picture) were specially designed and house G.E.C. equipment

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

B.I.F. Arrangements

Coronation year looks like being a record one for the British Industries Fair which is to be held in Birmingham and London from February 15th to 26th; already the area occupied last year has been exceeded by more than 10,000 sq. ft. Copies of the special advance edition of the London Section catalogue in nine languages have been sent to representatives of the Department of Overseas Trade in seventy countries, and more than sixty countries will be represented by the trade buyers who intend to visit the Fair. Visitors who are travelling by sea, rail or air from Europe can obtain fare reductions ranging from ten to fifty per cent. Below are given the names of exhibitors at London not included in the list published in our December 25th issue :—

Baker, Charles.
Beck, R. & J.
Brecknell, Munro & Rogers (1928), Ltd.
Daniels, T. H. & J., Ltd.
Kitchendom, Ltd.
Redfern, J., Ltd.
Schick Dry Shaver.
Stanley, W. F., & Co., Ltd.
Steiner, I., & M., Ltd.
Walker, Fender Co., Ltd.
Woodfyt Sales, Ltd.

E.D.A. Activities in 1936

One of the principal activities of the British Electrical Development Association during 1936 was the Million New Consumers Campaign. Advertising in the National Press was a special feature and large space advertisements appeared almost weekly for a period of eight to nine months. The national advertising was supported by members in local newspapers. Schools for the training of canvassers and representatives were held in London, Bristol, Birmingham, Manchester and Leeds. A refresher course was subsequently issued to every member of the Association. Other campaigns dealt with refrigeration and lighting, in co-operation with a group of refrigerator makers in the first case and the Electric Lamp Manufacturers' Association and the Joint Council of Qualified Opticians in the second. The demand for *Electrical Housekeeping* increased by 100 per cent. during the year.

Exhibition work also made substantial progress. Apart from national exhibitions organised by the Association, such as the I.M.E.A., the Association also organised special electrical sections in several exhibitions and agricultural shows. In addition, the Association assisted in the organisation of a large number of local exhibitions. Mass cookery demonstrations were arranged on behalf of the Corporations of Southend and Ilford, while assistance in regard to the design and equipment of electrical showrooms was given to a number of authorities.

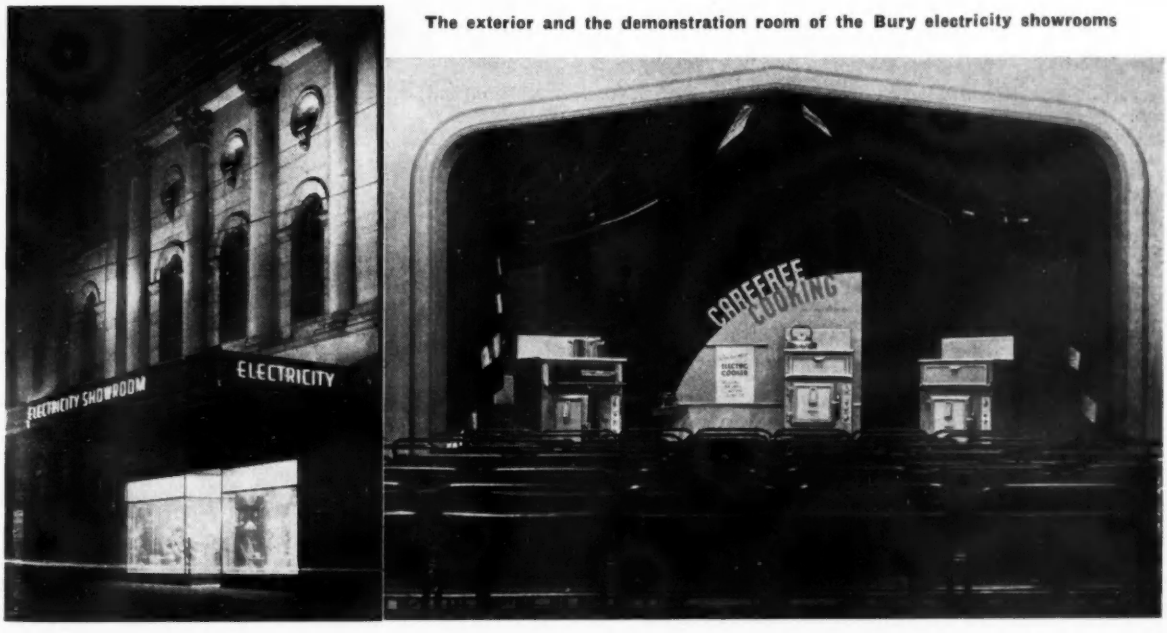
The reorganisation of the electrical section at the Building Centre proved satisfactory. On the sales side, in addition to the four day Sales Management Conference held in London in the spring, numerous one- and two-day conferences took place in provincial centres, while the public speaking competitions, salesmanship competitions and other general E.D.A. services continued to function satisfactorily. The work of the Special Committees dealing with water heating, cooking, industrial heating, rural electrification, small dwellings, etc., was considerable and a number of reports were issued. Twenty-seven new members were enrolled during the year.

Architects' Conferences on Lighting

A series of conferences on lighting for architects will be held at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, W.C., commencing on January 7th. These conferences afford practising architects an opportunity of keeping in touch with electric lighting developments. The programme is as follows :— January 27th : "Research and Progress in Lighting Problems," by W. J. Jones. February 3rd : "Recent Experiences in Lighting Practice"; speakers, Messrs. T. P. Bennett, R. H. Wren, S. Chermayeff, and R. O. Sutherland. February 10th : "Regulations for the Installation of Electrical Services"; speakers, Messrs. F. C. Raphael and H. W. Swann. February 17th : "Lighting Plans for the 1937 Paris Exhibition," by M. H. H. Maisonneuve.

The New Bury Showrooms

In our last issue we reported the opening of the new showrooms of the Bury Corporation Electricity Department. An electricity supply for Bury was inaugurated in 1896, and in 1911 the Chamber Hall power station was put into commission with an initial capacity of 4,000 kW. The plant capacity now aggregates 26,000 kW. In 1926, with the development of the supply for domestic purposes, the Electricity Committee decided to establish a showroom and demonstration room and subsequently showrooms were opened in the Transport Department's building in the Market Place. With the rapid growth of this Department these premises proved inadequate, and, in 1934, the Committee decided to consider a scheme for reorganisation with a view to centralising the Department in a more suitable position. The premises in Market Street were erected in 1850 and were originally designed for the staff of Lord Derby's agents, and for the provision of assembly rooms and town hall. In addition, there was a police court and central police station. The building has been reconstructed and provides offices for the accommodation of the administrative, clerical and distribution staff, in addition to well-equipped showrooms. At the back of the premises a new two-storey building comprising stores, workshop and meter testing departments has been erected. On the front of the building is fixed a projecting canopy which incorporates a neon sign and floodlights to illuminate the Derby Hall façade. The main showroom has special lighting arrangements in keeping with the general scheme which are designed to give various colour effects. A cash counter for receiving electricity accounts is in an alcove, and a demonstration and lecture room capable of seating sixty-five people is situated at the rear of the premises. The heating of the whole of the portion of the premises occupied by the Electricity Department and also the Derby Hall is by means of an electrode boiler combined with a storage system. The work of alteration and reconstruction has been carried out under the direction of Mr. J. Chadwick, borough engineer and surveyor, in collaboration with Mr. J. G. Potts, the borough electrical engineer and manager. The contractors included the following :—Falk, Stadelmann & Co., Ltd., for electric lighting fittings in the showroom; General Electric Co., Ltd., for the concealed lighting, Benjamin Electric, Ltd., for the office lighting; A. Reyrolle & Co., Ltd., for the



The exterior and the demonstration room of the Bury electricity showrooms

electrode boiler and heating equipment; and Ionlite, Ltd., for the neon signs on the canopy.

A South African Cable Factory

The Johannesburg correspondent of the *Financial Times* reports that the plant of African Cables Proprietary at Vereeniging has been completed, and production will commence shortly. It is hoped to relieve the difficulties of importing sufficient electric cables for South Africa's requirements, the annual imports of which are valued at £1,250,000. Anglo-Transvaal Consolidated Investment, associated with Lewis & Marks and New Kleinfontein interests, are principally concerned in this enterprise. The plant has cost about £100,000, and it is proposed to obtain the copper from Northern Transvaal.

Sir Felix Pole making the presentation to members of the Ediswan staff

Electric Service Vehicles

The first electric vehicle at West Ham was in use in 1903; the accompanying illustration shows the present fleet of electric vehicles assembled outside the Corporation Electricity Department's head offices and showrooms. The five streamlined vans are used to service extensive cooker and water-heater hire schemes and are attached to the consumers' service section. The staff is on duty daily from 7 a.m. to 11 p.m. (working in shifts) and with the electric vehicles an efficient and prompt service is maintained. The vehicles have a speed of twenty-seven miles per hour with a normal range of 40-50 miles and are fitted with Kathanode batteries. All charging apparatus is fitted with variable tappings so that a vehicle can be charged from any rectifier. The vans are of 5-cwt. and 5-7-cwt. capacity and were designed specially for service work and to provide a practical advertisement of the size and type of electric vehicle suitable for local tradesmen. The box van (next in the illustration) serves the dual purpose of mobile showroom and delivery van. The near side of the body is fitted with two doors, hinged at front and rear, to open and expose the whole interior of the van. Suitable fittings are provided to keep the doors open and held in position and the interiors of doors are fitted with removable panels that can be used for display purposes. Within the van provision is made for housing a cooker, wash-boiler, water-heater and other domestic apparatus and interior lighting is provided by bulkhead fittings on the near side cornice of the van. When not required for display purposes the apparatus can be removed and the van used as an ordinary delivery vehicle. Of the tower wagons, the one on the extreme right is the veteran of the Department's transport. This vehicle was purchased in 1914 and in 1923 it was fitted with a tower for public lighting maintenance.

Long Service Employés

Sir Felix Pole, chairman of Associated Electrical Industries, Ltd., which includes the Edison Swan Electric Co., Ltd., on January 6th, made a presentation to three members of the Ediswan staff at Ponders End, Middlesex, who had completed over fifty years' service with the company. These men were: Mr. J. Wade, of the lamp factory, who completed his fifty years' service on December 31st, 1935; he was presented with a canteen of cutlery. Mr. W. Stokes, a glass blower in the lamp factory, who completed his fifty years' service on January 7st last; he received a gold watch. Mr. W. Hutt, who has now completed fifty-four years' service; he also received a gold watch. Mr. Hutt, whose job is the exhausting of large rectifier valves for television, actually exhausted the first vacuum flask ever made. They were then known as Dewar flasks after the inventor, and were made at the Ediswan works, which were then at Benwell, Newcastle, under the direction of Sir Joseph Swan.

Wirral Electrification Contracts

The following further orders have been placed by the L.M.S. Railway with British manufacturers in connection with the electrification of the Wirral lines from Birkenhead Park to West Kirby and New Brighton: H. Fairclough Howley (Warrington) and Williams, Tarr & Co., Ltd. (Warrington), erection of sub-stations; Tyer & Co. (London), circuit-breakers; Herbert Morris (Loughboro'), crane; Siemens & General Electric Signal Co. Wembley, track circuits; B.T.H. (Rugby), motor equipment; Railway Signalling Co., Ltd. (Fazackerley, Liverpool), signalling; Johnson & Phillips, Ltd. (London), copper wire; and Mersey Cable Works (Liverpool), track cable.

Gas Fades Out!

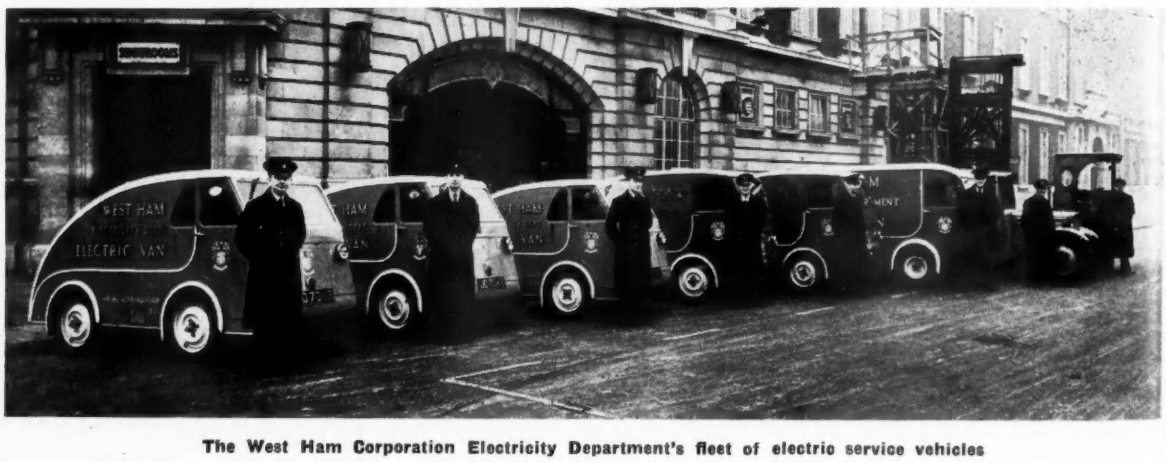
It is interesting to learn from Mr. W. A. Jackson, borough electrical engineer and manager of West Bromwich, that the Electricity Department accepted a challenge from the Gas Department on Saturday last to a football match, the result of which was a victory for Electricity by sixteen goals to two. There appears to be some significance in this.

A Refrigerator Convention

The fourth annual convention of the International Refrigerator Co.'s sales organisation was held at the May Fair Hotel last week, 357 delegates attending. For 1937 the price of certain B.T.H. models will be reduced, all models are guaranteed for five years, and incorporate the hermetically sealed refrigeration unit. During the convention the delegates were shown indicator diagrams illustrating the increased efficiency of the equipment. It was stated that there are 180 dealers for B.T.H. and "Coldrator" models. The advertising scheme for 1937 is an extensive one. At the banquet Mr. H. C. Timewell, joint managing director of the company, introduced the new "F.T.50," which is described on page 102.

Garcke's Manual

The 1936-37 edition of "Garcke's Manual of Electrical Undertakings and Directory of Officials," which has just been received (Electrical Press, Ltd., 37s. 6d. net), like its predecessors, provides a complete record of technical, financial and commercial information relating to electricity supply



The West Ham Corporation Electricity Department's fleet of electric service vehicles

undertakings in Great Britain and the British Commonwealth. It also gives the names and addresses of approximately 13,000 directors and officials, and a directory of 6,000 electrical contractors, arranged alphabetically under towns, and particulars relating to electric railway, tramway and trolley-bus systems, electrical manufacturing companies, and investment trusts and allied concerns. The section dealing with the progress during the year includes considerable statistical data on the financial and technical progress of the industry. The whole of the matter in the 2,100 pages has been revised and brought up to date.

Calendars

The calendar received from the Corpatact Manufacturing Co. bears a beautifully coloured autumn scene.

A modern Diana makes a charming picture for the calendar received from Christy Bros. & Co., Ltd.

Trade Announcements

Mr. S. Dagnall informs us that he has severed his connection with Dagnalls (Radio & Electrical), Ltd., and has started in business on his own account as Sid Dagnall & Son, electrical engineers and contractors, 2, Fulham Road, Sparkhill, Birmingham, 11. He asks for radio and electrical trade catalogues.

Mouldrite, Ltd., has removed its head office to Nobel House, 2, Buckingham Gate, S.W.1 (telephone: Victoria 8432).

The address of the Aluminium Protection Co., Ltd., is now Dialumin Works, Brentfield Road, Willesden, N.W.10.

Courtney, Pope & Co., Ltd., of Tottenham, N.15, have started their own electrical department and ask for catalogues and literature.

Mr. H. Tinsley, 11a, Thorn Lane, Leeds (telephone No. 66080 Leeds), has been appointed North Midlands representative of M. & C. Switchgear, Ltd., and Mr. G. R. Orchard, Brynheulog, Lon Cedwin, Sketty, Swansea (telephone: Sketty

[*Elec. Rev. photo.*

One of a series of electric cookery demonstrations which are being arranged at various depôts of the Express Dairy Co., Ltd.

88663), has been appointed the company's representative in South Wales.

S. Bill & Co., Ltd., have now removed to their new factory at Perry Barr, Birmingham, and have changed their name to Bill Switchgear, Ltd.

Social Events

The third annual dinner and dance of Ardente was held at the Princes Restaurant, Picadilly, W., on January 9th. The toast of "The King" was proposed by Mr. R. H. Dent, and Mr. F. Montague, M.P., former Under-Secretary for Air, proposed "Ardente." Mr. R. H. Dent, who replied, mentioned that in addition to the steady expansion of the deaf aid side of the business they now had many public contracts for acoustic work in connection with the Coronation celebrations.

The annual dinner and dance of the Lothians Electric Power Co., Ltd., was held on January 8th in Macvitt.e's Guest Rooms, Edinburgh. Viscount Trapain, in the course of proposing the toast of the company, referred to the concentration of population in a comparatively small area, which had been due to the erection of factories and workshops close to pitheads where cheap coal was available. A solution was the cheap distribution of electrical power, enabling them to use power at considerable distances from the coalfields at comparatively small increase in cost. Mr. R. P. Beddow, a director of the company, who responded, said that they had now developed their area to a large extent, and he hoped consumers and prospective consumers would make use of the service offered. Mr. H. C. Babb, general manager of the company, also spoke.

On January 8th the Trafford Park Works of Lancashire Dynamo & Crypto, Ltd., held their annual dinner-dance at the "Manchester Limited" Restaurant. Over 250 employés and friends were present. Mr. J. H. Dunbar (director) presided, and gave an account of the year's work of the company. A presentation of a gold watch was made to Mr. V. Quayle, vice-president of the Social and Athletic Club, in recognition of his services to the club since its inception in 1919.

Installation Accessories

In connection with the article on "Installation Accessories" by E. K. Muir which appeared in our issue of January 8th, our attention has been drawn to the "Utility" shade ring manufactured by Messrs. Wilkins & Wright, Ltd. This is of spring brass and is fitted with two claws for attachment that are extended in the other direction to serve as finger grips, permitting rigidity with ease of removal. The use of this type of shade ring usually makes the ordinary ring superfluous.

E.D.A. (Northern Counties Area)

More than 1,000 people were present at the annual carnival held at Newcastle-on-Tyne on January 9th by the Northern Counties Area of the British Electrical Development Association. The guests were received by Mr. A. C. Cramb, director and secretary of the Association. There was a long list of prizes given by electrical firms.

Russian Orders for Great Britain

Orders valued at £4,000,000 have been placed in the United Kingdom by the trade departments of the U.S.S.R. The bulk of the orders are for electrical equipment, machine tools, and equipment for steamships.

Works Visit

On January 4th the Hon. Walter Nash, M.P., Minister of Finance in the New Zealand Government, visited the Strowger Works, Liverpool, of the Automatic Telephone & Electric Co., Ltd. He was accompanied by Mr. A. F. Bennett, chief engineer of the company, and Mr. T. E. Lescher, chairman of the Liverpool Chamber of Commerce. The tour of the works included an inspection of the "life-test" section of the laboratories, where Strowger mechanisms are operated continuously under stringent conditions.

Electrical Commercial Travellers

The annual dinner of the Electrical Trades' Commercial Travellers' Association will be held on January 29th at the Connaught Rooms, W.C.2.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price, January 13th	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal) ... „	£18 10s.	—
a Borax ... ... „	£17	—
a Copper, Sulphate ... ... „	£15 10s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4¼d.	—
a „ Perchlorate ... ... „	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur Commercial ... ... per ton	£11	—
a „ Roll ... ... „	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a „ Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b „ Wire ... ... per lb.	1/1 to 1/9	—
b „ Sheet and Foil ... „	1/3 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£213	£1 dec.
Grade II ... ... „	£147	—
Grade III ... ... „	£76	—
c Brass (rolled metal 2" to 12" basis) per lb.	8¼d.	½d. inc.
c „ Tubes (solid drawn) ... ... „	11½d. to 11¾d.	½d. inc.
c „ Wire, basis ... ... „	9½d.	½d. inc.
c Copper Tubes (solid-drawn)... ... „	1/0½d.	½d. inc.
g „ Bars (best selected)... ... per ton	£81	—
g „ Sheet ... ... „		
g „ Rod ... ... „		
d „ (Electrolytic) Bars ... ... „	£57	£3 inc.
d „ „ Wire Rods ... „	£64	£4 inc.
d „ „ H.C. Wire ... per lb.	9 5/8d.	5/8d. inc.
f Ebonite Rod ... ... „	1/6 to 2 - plus	—
f „ Sheet ... ... „	1/3 to 1/6 10%	—
m German Silver Wire, Nos. 1 to 12 ... „	2 2	—
h Gutta-percha, fine ... ... „	nom.	—
h India-rubber, Para-fine ... ... „	1/2	—
i Iron, Pig (Cleveland, No. 3) ... per ton	67/6	—
i „ Wire galv. No. 1, P.O. Qual.... „	£20	—
g Lead, English Pig ... ... „	£30	10s. dec.
g Mercury ... ... per bot.	£14 5s.	—
e Mica (in original cases) small ... per lb.	9d. to 1/6	—
e „ „ „ medium ... „	5/- to 10/-	—
e „ „ „ large ... „	10/6 to 17/6 up	—
p Phosphor Bronze, plain castings ... „	1 2	—
p „ „ drawn bars & rods „	1/1d.	½d. inc.
p „ „ rolled strip & sheet „	1/0½d.	½d. inc.
p „ „ wire ... ... „	1 2½.	½d. inc.
o Platinum ... ... per oz.	£9 15s.	—
d Silicium Bronze Wire ... ... per lb.	9½d	½d. inc.
g Spelter ... ... per ton	£20 18 9	18s. 9d. inc.
r Steel, Magnet, in bars ... ... per lb.	7¼d.	—
g Tin, Block (English) ... ... per ton	£231	£4 15s. inc.
n „ Wire, Nos. 1 to 16 ... ... per lb.	4/1	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Son, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes."

New Catalogues and Lists

Sun Electrical Co., Ltd., 118, Charing Cross Road, London, W.C.2, has issued the fifth edition of its 790-page general catalogue. This catalogue, which is fully illustrated and bound in a stiff red cover, deals with almost every type of electrical apparatus except domestic equipment and decorative lighting fittings.

Johnson & Phillips, Ltd., Charlton, S.E.7.—Four new lists have been issued dealing with on-load tap-changing equipment, industrial switchgear, all-steel draw-out truck type switchgear, and kiosk type sub-stations.

Gent & Co., Ltd., Faraday Works, Leicester.—Book 5, Section 7a, dealing with "Tangent" synchronous clocks.

British Insulated Cables, Ltd., Prescot.—A catalogue of rubber-insulated cables and wires.

Callender's Cable & Construction Co., Ltd., Hamilton House, Victoria Embankment, London, E.C.4.—A complete catalogue of rubber-insulated cables and flexibles.

Sterling Batteries, Ltd., Sterling Works, Dagenham.—A leaflet dealing with dry batteries.

Babcock & Wilcox, Ltd., Farringdon Street, London, E.C.4.—A 60-page illustrated art catalogue containing technical information on stokers.

James Beresford & Son, Ltd., Cato Street Works, Birmingham, 7.—A list illustrating cellar and sump drainage pumps.

Higgs Motors, Ltd., Witton, Birmingham, 6.—New catalogue sections dealing with d.c. machines, fractional h.p. motors, small battery charging sets, totally enclosed induction motors, vertical spindle motors, polishing and grinding motors, and plain bearing machines.

Collier Electric Co., Ltd., Colmac Works, Edwin Road, Twickenham.—A list of bakelite accessories.

Ruston & Hornsby, Ltd., Lincoln.—A catalogue of oil engines.

H. Wallwork & Co., Ltd., 18, Roger Street, Manchester, 4.—Description and load tables of "Wallwork" worm gears.

J. A. Crabtree & Co., Ltd., Walsall.—An illustrated leaflet dealing with "semi-standard" control units.

Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, London, W.C.2.—A pocket price list of a.c. and d.c. electric motors and control gear.

Bankruptcy Proceedings

G. Ireland, near the Oak Inn, Fambridge Road, Maldon, Essex, electrical engineer.—The first meeting of creditors herein was held on January 5th at 29, Russell Square, London, W.C.1. According to the statement of affairs there were gross liabilities of £704, of which £264 was expected to rank, and there was a deficiency of that amount. Debtor attributed his failure to illness of his wife and unemployment. The case being a summary one was left in the hands of the Official Receiver.

K. Nicholson and **F. Hyde** (City Electrical Co.), electrical contractors, lately of 8, Southgate, and 100 and 102, Morley Street, Bradford.—Public examination February 12th at the County Court, Bradford.

G. F. Jenkins, electrician, 24, Browning Road, Enfield.—Public examination January 20th at the Court House, Upper Edmonton, N.

C. H. Chinery, lately trading with another as Harden & Chinery, 7, Barnsbury Street, Islington, N. (separate application).—Discharge suspended for one year until November 19th, 1937.

P. M. Gill (Swinton Radio Service), radio and electrical dealer, 166-170, Partington Lane, Swinton, and also at Davyhulme, Lancs.—First and final dividend of 2s. 3½d. in the £, payable January 15th at the Official Receiver's Office, Byrom Street, Manchester.

A. Plotzker, wireless dealer (described in the receiving order as G. A. Walsh), 47, Woodstock Avenue, Golders Green, Middlesex.—Discharge suspended for six months until June 15th, 1937.

J. E. Denley (J.E.D. Installations), electrical contractor, 67, Stracey Road, Forest Gate, E.7.—First and final dividend of 2s. 5d. in the £, payable any day (except Saturday) at Bankruptcy Buildings, Carey Street, W.C.

Company Liquidations

Picton Electrical Patents, Ltd., 4-5, Broad Street Place, E.C., and Wembley.—Under the compulsory liquidation of this company the accounts show liabilities of £1,497 against assets of £425, an issued capital of £1,645, and a total deficiency of £2,717. Mr. H. P. Naunton, Assistant Official Receiver, reports that the company was formed in July, 1935, to acquire and exploit an invention for use in connection with electrical circuits. The inventor was Joseph Picton, who was appointed managing director of the company. The consideration given by the company for the invention was £100 in shares. In September, 1935, workshop premises were taken and equipped at Exhibition Grounds, Wembley, but it appeared that the company did not find the Picton rectifier—which was the name by which the invention came to be known—readily marketable, and in April last the factory was closed, and on June 19th Picton presented the petition on which the winding-up order was made on July 6th. The Official Receiver, as liquidator, has assigned the letters patent in consideration of a prompt payment of £100 and of such sum by way of royalty as may be necessary to pay the creditors 20s. in the £. The royalty is one of 10 per cent. and is based on the sale price of all articles made under the patent or on the proceeds of any licence granted thereunder.

Strand Radio, Ltd.—Winding up voluntarily. Liquidator, Mr. S. L. Lewis, 102, Bishopsgate, E.C.2.

Vabest, Ltd.—Winding up voluntarily. Liquidator, Mr. C. A. Roper. This is a members' voluntary liquidation and all creditors have been, or will be, paid in full.

Webb & Goward, Ltd.—Particulars of claims by January 22nd to Mr. A. Willmott, joint liquidator, 73, Cheapside, E.C.2. Meeting February 12th at 15-17, Hertford Street, Coventry, to receive an account of the winding up by the joint liquidators, Messrs. K. S. Peirson and A. Willmott.

T. M. Johns & Co., Ltd.—Winding up voluntarily. Liquidators, Mr. W. J. A. Osborne and Mr. F. E. Bendall, of London and Birmingham.

Electricity Supply

Lighting, Domestic, Power

Accrington.—STREET-LIGHTING IMPROVEMENTS.—A comprehensive scheme for the improvement of street lighting in the town is to be undertaken by the Lighting Committee.

Argentina.—EXTENSION OF CONCESSION.—It is reported from Buenos Aires that the municipal authorities have agreed to extend the concession to the various electricity supply undertakings in their area from 1957 to 1972.

Banff.—STREET LIGHTING.—The principal streets of the burgh will shortly be lighted by electricity. There will be 213 electric lamps, replacing 115 gas lamps.

Barrow-in-Furness.—NEW FEEDERS.—The Electricity Committee is to lay additional low-voltage feeders at Walney at a cost of £1,316.

LOAN.—Sanction is being sought to a loan of £24,077 for mains and switchgear.

Birkenhead.—WIRING SCHEME.—The Town Council has received sanction from the Electricity Commissioners to borrow £10,000 for wiring installations under the assisted-wiring scheme.

Bridgend.—COUNCIL TO RETAIN UNDERTAKING.—The Porthcawl Electricity Co., Ltd., recently put forward a proposal that the Bridgend undertaking should be operated under the joint control of the company and of its present owners, the Bridgend Urban District Council. This amalgamation, it was suggested, would result in an appreciable reduction of the overhead charges and would also materially increase the earning capacity of the undertaking. A reply has been sent that the Council is unable to entertain the proposal.

Brynamman.—UNDERTAKING ACQUIRED.—It is officially announced that the Brynamman and District Electric Supply Co., Ltd., has been acquired by the South Wales Electric Power Co.

Cheltenham.—LIGHTING IMPROVEMENTS.—The Electricity Committee is to improve the lighting of Old Bath Road at a cost of £728.

Dover.—CONSIDERATION OF TWO-PART TARIFF.—The town clerk and chief clerk of the Electricity Department recently had an interview with Mr. J. M. Kennedy (Electricity Commissioner), when the subject of a two-part tariff was discussed. Mr. Kennedy said that Dover was one of the few places where the system had not been adopted, and in reply it was stated that, owing to the considerable expenditure now being incurred by the undertaking, the Council thought it advisable to defer the matter until March, 1939. Mr. Kennedy intimated that, in view of the recommendations of the McGowan Committee, it would, in all probability, be unwise for the Council to defer the adoption of a two-part tariff much longer. At a subsequent meeting of the Electricity Committee it was decided to appoint a sub-committee to consider the introduction of such a tariff.

Estonia.—ELECTRIFICATION SCHEME.—It is reported from Tallinn that the Government is engaged on the preparation of plans for an extensive electrification scheme.

Hastings.—DEVELOPMENT PROJECTS.—The Electricity Committee is to lay a 22,000-V cable between the sub-stations at Fairlight and Pett Level. Including certain additional switchgear, the cost is £2,485. The Committee is also to erect a sub-station and extend mains at a cost of £1,095 to provide a supply to a nursery. A switch kiosk and cables are to be provided at Brede Hill (£1,900).

High Wycombe.—STREET-LIGHTING IMPROVEMENTS.—The Wycombe (Borough) Electric Light and Power Co., Ltd., has recently installed 400-W "Osira" electric-discharge lamps housed in G.E.C. "Di-fractor" lanterns for the lighting of Oxford Road. The installation was designed in collaboration with the borough engineer and surveyor, Mr. T. J. Rushbrooke, and the company's engineer and manager, Mr. C. T. Westlake.

Hull.—NEW EQUIPMENT.—The Electricity Committee has obtained sanction to borrow £1,107 for mains extensions to Routh, £6,000 for the purchase of the property adjoining Sculcoates generating station for the purposes of coal sidings and accommodation, etc., £35,121 for extensions at Sculcoates generating station, and £12,274 for a trolley-bus scheme.

India.—GOVERNMENT'S POLICY.—The United Provinces Government, having developed the Ganges grid in the western districts, is now turning its attention to the eastern and central districts. To this end it has had under consideration what its attitude shall be towards further applications for licences for the generation and distribution of electricity. It feels that the local distribution of electricity can most profitably be entrusted to companies dependent for their existence on the efficient co-ordination and successful working of their concerns, and which are compelled, therefore, to employ technically qualified and commercially competent staffs. This has led the Government to the conclusion that it will usually be inadvisable to grant distributing licences to local bodies. Licensees must undertake to install only such plant as, in the opinion of the Electrical Advisor to the Government, can be suitably adapted to the ultimate requirements of the grid. Similarly, they must adjust their maximum retail charges in

conformity with the price at which they will obtain energy in bulk from the Government.

Kettering.—OVERHEAD LINE.—Revised plans for an overhead line route to Corby across the Council's land have been approved by the Kettering Rural District Council.

Leyton.—NEW EQUIPMENT.—Application has been made by the Town Council for sanction to loans of £16,500 for rectifier equipment and additional switchgear for the Waterloo Road sub-station, needed to meet the demands of the London Passenger Transport Board for power for trolley-buses, and £2,400 for feeders and switchgear in connection with a further bulk supply from the Walthamstow Council.

London.—CLOSING OF PARK ROYAL GENERATING STATION.—The Great Western Railway Co.'s generating station at Park Royal, which was put into commission about thirty years ago to supply power for the electrified lines and generally for lighting, heating and power in the area, has been closed down, the necessary supplies being now obtained from the system of the Metropolitan Electric Supply Co.

Manchester.—SUB-STATION.—A new sub-station is to be provided at Monsall Hospital by the Health Committee at a cost of £425.

North-West Midlands.—NOTEWORTHY PROGRESS.—Forty per cent. more electricity was sold in 1936 than in 1935 in the distributing area of the North-West Midlands Joint Electricity Authority, states Mr. F. Favell, chief engineer and manager. The sales totalled 23.6 million kWh. At the same time the number of consumers increased by 42 per cent., giving a total of 7,500 residing in 152 towns and villages spread over the large area of supply. Sales to constituent members also showed substantial improvement, as follows (1936 totals in million kWh, with per cent. increase in parentheses):—Stoke-on-Trent Corporation, 97.4 (18); Stafford, 17.1 (11); Congleton, 2.7 (42); Leek, 4.0 (25); Newcastle, 1.3 (30); Market Drayton Electric Light & Power Co., Ltd., 0.7 (40); Trent Valley & High Peak Electricity Co., Ltd., 2.1 (11); total, 125.3 (18). During the year large supplies have been arranged for water pumping stations, copper works, coal mines, stone quarries, dairies, textile and other factories, &c.

St. Helens.—RATEABLE-VALUE TARIFF.—A scheme for supplying electricity to residents outside the borough on the basis of a rateable-value tariff has been introduced by the Electricity Committee. The charges are: All houses with a rateable value of £11 or under, 20 per cent. of the rateable value; from £11 to £20, inclusive, 15 per cent.; over £20, 12½ per cent. The running charge is 0.6d. per kWh in all cases. Consumers may choose either the flat-rate or rateable-value tariff, but the selected tariff is to remain in force for at least one year. It is a condition of the new tariff that consumers shall, in addition to their lighting consumption, take a minimum of 364 kWh per annum for domestic appliances.

Stalybridge.—CHRISTMAS LOAD.—We have received from Mr. J. H. Lumsden, chief engineer to the Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board, a graph showing the load on the undertaking on Christmas Day in the past three years. This indicates an interesting growth. The periods of heavy demand are generally just after midnight, from 11 a.m. to 1 p.m., and from 5 p.m. to 7 p.m. A possible reflection of the increasing adoption of electric cookers is the accentuated rise of the curve in the midday period. Whereas in 1934 the consumption at this time was well below that in the evening, on Christmas Day last it was almost as great, with a pronounced "valley" in the afternoon.

SHOWROOM BUSINESS.—The Board connected the following domestic appliances during 1936 as a result of showroom business. Totals connected at the end of the year are given in parentheses. Cookers, including the breakfast type, 867 (1,724); wash-boilers, 331 (728); radiators, 503 (1,288); and immersion and storage water-heaters, 580 (1,073).

Sunderland.—EXTENDING THE ILLUMINATIONS.—Encouraged by the success of its efforts last summer, the Illuminations Committee proposes that this year's event shall continue for a month instead of three weeks. Additional features are contemplated.

Wakefield.—SUB-STATION.—The Electricity Committee is to erect a sub-station at Thornes at a cost of £600.

Traction

Darlington.—TRANSPORT UNDERTAKING.—A proposal to divide the Corporation transport and electricity undertakings into two distinct departments was discussed at a recent meeting of the Town Council, when the matter was referred back to the General Purposes Committee. The Gas and Electricity Committee recommended the appointment of a transport manager at a commencing salary of £650 per annum.

Italy.—MORE STREAMLINED TRAINS.—The Italian State Railways have announced their intention of ordering eight further triple-car streamlined trains suitable for attaining speeds up to 100 m.p.h. on the 3,000-V d.c. lines between Bologna, Florence, Rome and Naples.

London.—RAILWAY TRANSPORT IN N.E. AREA.—Complete details have now been published of the scheme for extending and improving railway services in North-east London, the plans following closely the proposals outlined in the autumn of 1935. The L.P.T.B. and the L.N.E.R. will between them spend £14,500,000 to give this area efficient transport facilities to the West End and the City. The work will occupy approximately three years, and throughout that time direct and indirect employment will be given to an average of 25,000 people. The projection of the Central London line will necessitate the construction of 9½ miles of double track, nearly all in tube and "cut and cover" construction, while 22½ miles of L.N.E.R. surface lines will be electrified. A new rolling stock depôt will be constructed between Grange Hill and Hainault. Apart from the joint scheme the L.N.E.R. will undertake electrification of its lines between Liverpool Street and Shenfield, together with the contingent electrification between Stratford and Fenchurch Street. Twenty-five route miles of L.N.E.R. lines (100 miles of single track) will be converted.

New Hydro-electric Works in Canada

THE annual review of hydro-electric progress in Canada discloses that, although a comparatively small addition was made to the total developed water-power capacity in the Dominion during 1936, there are a number of developments actively under construction which will add materially to the total in the next year or more. New installations during 1936 aggregated 36,475 h.p., bringing the total for the Dominion at the end of the year to a figure of 7,945,590 h.p. The new installations were chiefly additions to existing developments.

A number of installations are under consideration in British Columbia. The Vancouver Island Power Co., for instance, proposes to supplement its power supply by a 1,953-h.p. installation on Loss Creek, while the Consolidated Mining and Smelting Co. is, through its subsidiary the Buena Vista Mining Co., installing two 1,500-h.p. wheels on Cascade Creek for the purpose of supplying Big Missouri mine.

No new power development was undertaken in Alberta during the year, but in Saskatchewan the Churchill River Power Co. is installing an additional 19,500-h.p. unit at its Island Falls plant for which concrete work and the power house extension is practically completed. In Manitoba, the city of Winnipeg has commenced the installation of a third unit (12,500 h.p.) at its Slave Falls development on the Winnipeg River which, it is expected, will be ready for operation next autumn. The Manitoba Power Commission added 133 miles to its transmission system and erected a number of new sub-stations during 1936.

In Ontario, development was confined to the north-western section of the province. The Hydro-Electric Power Commission of Ontario, which completed the construction of and operates the Canyon (Abitibi River), and constructed and operates Ear Falls (English River) and Rat Rapids (Albany River) stations as trustee for the Provincial Government, brought a new unit of 1,750 h.p. into operation in the Rat Rapids station early in October and is proceeding with construction to provide for the installation of a second unit of 5,000 h.p. in the Ear Falls station. Consideration was also given by the Commission to the development of a 10,000-h.p. site at Ragged Rapids on the Musquash River to augment the supply of power to its Georgian Bay system, and to further development on the Madawaska River for its Eastern Ontario system. The Great Lakes Power Co. has constructed a dam and power house on the Montreal River which will be interconnected with its other plants at Sault Ste. Marie and Michipicoten Falls. The initial installation is 10,000 h.p.

The only additional installation in Quebec was that of a fourth 30,000-h.p. unit at the Maclaren-Quebec Power Co.'s hydro-electric plant on the Lievre River at High Falls, bringing this development up to its full capacity of 120,000 h.p. Power developments now under construction include the Ontario Paper Co.'s 66,000-h.p. hydro-electric plant on the Outardes River at Outardes Falls. The City of Sherbrooke has started preliminary work on a 7,000-h.p. development at Two-Mile Falls on the St. Francois River and the town of Magog contemplates a $400,000 hydro-electric development on the Salmon River near Kingsbury.

The New Brunswick Electric Power Commission completed and placed in operation about 190 miles of 6,600-V transmission lines.

In Nova Scotia, the Power Commission completed a 4,300-h.p. addition to its Ruth Falls plant on East River Sheet Harbour. The Gaspereau-Black River diversion of the Avon River Power Co., a subsidiary of the Nova Scotia Light and Power Co., has been completed to augment the water supply to the Hell's Gate development on the Black River. There are now under construction a 2,500-h.p. development at Salmon Hole on the St. Croix River by the Minas Basin Pulp and Power Co. and a 3,750-h.p. power development on Paradise Brook by the Annapolis Power and Paper Co., while a 5,200-h.p. development is projected by the Nova Scotia Power Commission at Lower Great Brook on the Mersea River to supply the increasing power demands of the Mersey Paper Co.

A fly-over will be required west of Ilford. Electrification of these lines (Liverpool Street-Shenfield and Stratford-Fenchurch Street) will be on the d.c. overhead system, with a maximum voltage of 1,500. Six sub-stations will be required, with a total installed capacity of 32,000 kW. The service density will necessitate adoption of automatic and non-automatic multiple aspect colour-light signalling, together with power signalling on certain sections of the route.

Newcastle-on-Tyne.—TROLLEY-BUSES.—The Ministry of Transport has granted a provisional order to the City Council empowering it to extend its trolley-bus service on additional routes in the city.

South Africa.—CAPE TOWN ELECTRIFICATION.—An extension of the Cape Town electrified suburban system is being made by the conversion of the three-mile Pinelands-Langa branch. Four additional motor-coaches are to be built for this new electric service.

ANNUAL STATISTICS.—In the fiscal year 1935-36 the South African Railways obtained 177,760,000 kWh from the Colenso and Salt River power stations for the Natal and Cape Town electrified lines (an increase of 15 per cent. over the preceding year) at a cost of £462,650. The electrically hauled traffic over the 3,000-V d.c. Natal main line increased by 10 per cent. to 7,061,450 tons, and on the 1,500-V d.c. Cape Town suburban system the number of passengers carried increased by 2 per cent. to 29,464,793.

Communications

Birmingham.—TELEPHONE HOUSE.—The official opening ceremony will take place on January 21st of Telephone House, Birmingham, which has been built and equipped at a cost of £600,000. The Chancellor of the Exchequer will perform the ceremony.

Finland.—TELEPHONE CABLES.—It is reported from Helsingfors that the Finnish Post and Telegraph Administration is preparing a programme for improving the home and foreign telephone systems. It is proposed to lay three large land cables, and also a new marine cable between Finland and Sweden. The expenditure in connection with these works is estimated at between 150 and 200 million Finnish marks.

New broadcasting station at Dairen, Manchukuo, at the opening of which the G.E.C. organised a stand showing its latest radio receivers

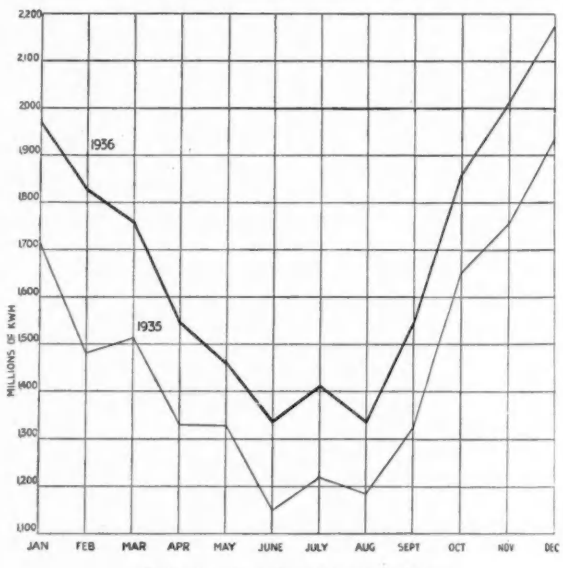
London.—TIME BY TELEPHONE.—The total number of calls handled by the Post Office "speaking clock" from the inauguration of the service on July 24th until the end of the year was 5,153,638.

Generation of Electricity in 1936

THE official returns rendered to the Electricity Commissioners show that 2,180 million kWh of electricity was generated by authorised undertakings in Great Britain during December, as compared with the revised figure of 1,929 million kWh in the corresponding month of 1935, representing an increase of 251 million kWh, or 13 per cent. The number of working days in the month (*i.e.*, excluding Sundays and Bank Holidays) was 25, as against 24 last year.

During 1936 the total quantity of electricity generated by authorised undertakings was 20,220 million kWh, as compared with the revised figure of 17,568 million kWh for the corresponding period of 1935, representing an increase of 2,652 million kWh, or 15.1 per cent.

Except for February and May the past year's curve followed closely that of 1935, but at a substantially higher level. In regard to the former month, the extra day due to Leap Year caused the percentage increase to be unusually high—23.4,



Output curves for 1935 and 1936

while the Jubilee celebrations in May, 1935, were presumably responsible for the deviation in the curve at that particular point.

In November last the monthly output exceeded two million kWh for the first time, and the curve continued sharply upward in December. The smallest output in any one month in 1935 was 1,147 million kWh in June, whereas last year it was 1,332 million kWh in August. The lowest level of last year's curve was thus 16 per cent. above that of 1935, while the highest point was only 13 per cent up, indicating a slightly better degree of plant utilisation.

Extensions of Selected Stations

EARLY last year the Central Electricity Board announced extensions accounting for over 400,000 kW of generating plant and over 5,000,0000 lb. per hr. of boilers mainly for the requirements of the winter of 1938. The Central Board, with the approval of the Electricity Commissioners, has recently issued directions to owners of selected stations to install further plant of about 400,000 kW to meet the winter load of 1939. The value of plant approved in 1936 is £10 million, bringing the total value during the past three years to approximately £25 million. This is in addition to the new 120,000-kW station (initially) on the Thames near Dartford to be constructed by the Kent Electric Power Co. before the winter of 1939. The details of the extensions now announced are as follows:—

Scheme Area.	Station.	Owners.	Generating Plant, No. and Capacity, kW.	Boilers, etc., No. and Capacity (lb. per hr.).
Central Scotland ...	Carolina Port ...	Dundee Corpn.	One 30,000	Four 100,000.
N.W. England and N. Wales.	Stuart Street ...	Manchester Corpn.	One 30,000	Two 130,000
	Clarence Dock ...	Liverpool Corpn.	—	One 200,000
Mid-East England	Ferrybridge	Yorkshire E.P. Co.	One 40,000	Four 125,000.
" "	Blackburn Meadows	Sheffield Corpn.	One 50,000 One 30,000	Three 187,500; one cooling tower, 3,500,000 gal.
" "	St. Andrew's Road	Huddersfield Corpn.	One 20,000	Two 120,000 two cooling towers, each 550,000 gal.
" "	Prince of Wales	Rotherham Corpn.	—	One 200 000.
" "	Grimsby	Grimsby Corpn.	One 15,000	One 80,000. two 60,000 inc. to two 80,000.
" "	Neepsend	Sheffield Corpn.	—	One cooling tower, 3,500,000 gal.
Central England ...	Longford	Coventry Corpn.	One 30,000	Two 150,000; one cooling tower, 1,500,000 gal.
" " ...	Hams Hall	Birmingham Corpn.	—	One 250,000; one cooling tower, 2,650,000 gal.
" " ...	Freeman's Meadow.....	Leicester Corpn.	One 30,000	Two 175,000; one cooling tower, 700,000 gal.
" " ...	Ironbridge	West Midlands J.E.A.	One 50,000	Three 270,000
" " ...	Stourport	S.W.S. E.P. Co.	Two 30,000	Three 182,000
South-East England	Woolwich	Woolwich Corpn.	One 30,000	Two 150,000
	Croydon	Croydon Corpn.	—	One cooling tower, 1,500,000 gal.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aberdeen.—January 20th. County Council. Electrical work in cottages at New-Machar. A. H. L. MacKinnon, architect, 245, Union Street.

January 20th. Royal Infirmary. Electric lighting at new laundry building, Burnside. J. B. Nicol, 367, Union Street.

Army Contracts.—Manufacturers who are not on the War Office list of tenderers and wish to be invited to tender for stores should apply to the Director of Army Contracts, Caxton House (West), Tothill Street, London, S.W.1. (January 8th.)

Australia.—MELBOURNE.—February 9th. State Electricity Commission of Victoria. One 37,500-kVA outdoor type transformer, with spare coils and bushings. (T. 31045.)*

Bishop's Stortford.—February 8th. U.D.C. Duplicate sets of electrically driven horizontal turbine pumping plant with incidental works. Surveyor, Council Offices (deposit £2 2s.).

Blackpool.—January 26th. Borough Council. Annual supply of various stores and materials. (See this issue.)

Bury.—January 30th. Corporation. Thermostatically controlled fire detectors and alarms in the Market Hall. P. H. Lawson, markets superintendent, Market Hall.

Colwyn Bay.—February 1st. Electricity Department. Cables, two transformers, two kiosks complete with transformer and switchgear, and one l.v. switchboard. (January 8th.)

Dumfries.—January 21st. Town Council. Electrical installations in 152 houses at Troqueer Holm. R. S. Osborne, burgh surveyor.

Eastbourne.—January 25th. Electricity Committee. Fire fighting apparatus and equipment for the generating station and two sub-stations. (January 1st.)

Egypt.—CAIRO.—February 3rd. Ministry of Public Health. Automatic time switches, meters, cut-outs, transformers, cables, boxes and lanterns. (T. 31049.)*

Finchley.—January 25th. Borough Council. Electric vehicles. (January 8th.)

Gainsborough.—February 5th. U.D.C. Electricity Department. Cable, meter boards and joint box compound for twelve months. (January 8th.)

Halifax.—February 9th. Light, Heat & Power Committee. 250,000-kVA, 6,600-V, duplicate bus-bar metal-clad switchgear, steel control panels, turbine telegraphs and other control-room apparatus. (See this issue.)

Hastings.—January 26th. Borough Council. Electrical materials for twelve months. (January 8th.)

Hornchurch.—January 23rd. U.D.C. Telegraphic street fire alarm system. (January 8th.)

Hull.—January 19th. Electricity Department. Electrical stores for twelve months. (January 1st.)

India.—NEW DELHI.—February 13th. Stores Department. Meter testing apparatus. (T.Y. 31066.)*

February 5th. Bombay, Baroda & Central India Railway Co. Motor-driven vertical air compressor. (See this issue.)

Irish Free State.—February 12th. Electricity Supply Board. Power transformers. (January 1st.)

Leeds.—January 25th. Housing Committee. Various works, including electrical, for maintenance repairs on housing estates and miscellaneous properties. R. A. H. Livett, housing director, 26, Great George Street.

Liverpool.—January 16th. Corporation. Twelve months' supply of electrical materials. (January 1st.)

London.—HAMMERSMITH.—January 27th. Borough Council. Electrical stores for twelve months. (January 8th.)

BETHNAL GREEN.—January 25th. Borough Council. Electrical materials. (January 8th.)

HACKNEY.—January 27th. Borough Council. Electrical installation in a block of fifty flats at Shacklewell Lane, E.8. (January 8th.)

STOKE NEWINGTON.—January 19th. Borough Council. Electrical stores for twelve months. (January 8th.)

BATTERSEA.—February 3rd. Borough Council. Electrical stores for one year. (See this issue.)

Luton.—January 18th. R.D.C. Borehole pump, surface gear, electric motor, switchgear, &c. H. Pickering, 73, West Parade, Dunstable, Bedfordshire (deposit £3 3s.).

Manchester.—January 19th. Electricity Committee. Cable. H. C. Lamb, chief engineer and manager, Electricity Department, Town Hall.

January 28th. Domestic electric cookers for twelve months. (See this issue.)

New Zealand.—WELLINGTON.—February 2nd. Public Works Department. Cable and disconnecting joint and terminal boxes. (T. 31056.)*

North Riding.—January 22nd. County Council. Supplies for twelve months, including electric lamps. H. G. Thornley, clerk of the County Council, County Hall, Northallerton.

Northern Ireland.—BELFAST.—January 18th. Tramways Committee. Stores, including electrical accessories, cables, insulation, carbon brushes, trolley heads, overhead wires and fittings, spares for tramcar electrical equipments and lamps for twelve months. General manager, Tramways Department, Sandy Row.

Rotherham.—January 23rd. Borough Council. One 3-ton electric crane with floor control, one 20-cwt. transporter-bridge with electric travel, one 20-cwt. two-motor electric hoist and overhead runway and curves. T. P. Sykes, Transport Department, Municipal Buildings.

Salford.—January 22nd. City Council. Twelve months' supply of p.i. cables. (See this issue.)

South Africa.—PRETORIA.—February 12th. Union Tender and Supplies Board. Telegraph and telephone line material. (T. 31062.)* Twenty-six motor-driven generators. (T.Y. 31063.)*

JOHANNESBURG.—February 13th. City Council. 750-kW automatic rotary convertor and equipment. (T.Y. 31038.)*

February 15th. Trolley-vehicle overhead equipment. (T.Y. 31064.)*

Southend-on-Sea.—February 2nd. Corporation. H.v. and l.v. underground cables for two years and a section of overhead h.v. line. (See this issue.)

February 4th. Electrical stores for twelve months. (See this issue.)

Stoke-on-Trent.—February 3rd. North-West Midlands Joint Electricity Authority. Outdoor type static transformers and electricity meters. (See this issue.)

Stretford.—January 26th. Borough Council. Twelve months' supply of materials, including electric lamps (Ref. No. 6). Town clerk, Town Hall.

Swansea.—January 26th. Electricity Department. Electrical stores for twelve months. (January 1st.)

Torquay.—February 5th. Corporation. Twelve months' supply of electric lamps. Borough engineer.

Tynemouth.—February 1st. Corporation. Cables. (January 8th.)

Uruguay.—MONTEVIDEO.—February 23rd. State Electricity Supply and Telephones Administration. Insulated copper conductors. (T.Y. 31058.)*

West Riding.—January 25th. Standing Joint Committee. Electrical work at alterations to the Keighley police station. West Riding architect, County Hall, Wakefield.

January 30th. Public Assistance Committee. Electrical wiring in connection with the installation of calorifiers, pumps, motors, &c., at the County Public Assistance Institution, Batley. P. O. Platts, architect, County Hall, Wakefield.

Wimbledon.—January 25th. Corporation. Cables. (See this issue.)

Worksop.—January 20th. Corporation. Testing equipment. (January 8th.)

Worsley.—January 23rd. U.D.C. Fittings, including electric wash-boilers, for sixty-six houses and bungalows on the Ash Street and Old Clough Lane estates. J. Howard, engineer and surveyor, Town Hall, Walkden.

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Accrington.—Electricity Committee. Accepted. Cable for twelve months.—W. T. Glover & Co.

Barrow-in-Furness.—Electricity Committee. Accepted. Two 300-kVA transformers (£187 each).—British Electric Transformer Co. Kiosk (£308).—Met.-Vick. Elecl. Co.

Birkenhead.—Electricity Committee. Accepted. Twelve months' supply of r.i. cables.—G. P. Dennis, Ltd.; Mersey Cable Works, Ltd.

Blackburn. — Transport Committee. Accepted. Twelve months' supplies: Copper wire.—London Electric Wire Co. and Smiths, Ltd.; overhead equipment.—A. Wiseman, Ltd.

Bradford.—Hospital Committee. Accepted. Electrical installations at the Westwood Institution (£237).—Armitage and Longbottom.

Buckhaven and Methil (FIFE).—Town Council. Recommended. Electrical work at 104 houses (£654).—Miller & Stables.

Carlisle.—Electricity Committee. Accepted. Electric delivery van.—Graham & Roberts, Ltd. Cables for two years.—Metropolitan Electric Cable & Construction Co. Meters for twelve months.—Ferranti, Ltd.; Smith Meters, Ltd.; Landis & Gyr, Ltd.; British Sangamo Co.; Met.-Vick. Elecl. Co.; Chamberlain & Hookham, Ltd.

Dukinfield.—Town Council. Accepted. Electric lighting at seventy houses on the Lakes Road South estate.—Johnson & Turner.

East Ham.—Electricity Committee. Recommended. 500-kVA transformer (£271).—English Electric Co.

Glasgow.—Health Committee. Accepted. Internal telephones in the Public Health Department (£300).—Dictograph Telephones, Ltd.

Transport Committee. Recommended. 25,000-kW turbo-alternator for the Pinkston power station (£39,756).—B.T.H.

Gt. Yarmouth.—Electricity Committee. Accepted. Cables (£5,619).—B.I. Cables, Ltd.

Education Committee. Recommended. Electrical installations at Gorleston schools (£598).—Bowers & Barr. Lowest of five tenders, highest being £809.

Hastings.—Parks Committee. Accepted. Electrically driven floral clock at White Rock Gardens (£157).—J. Ritchie & Son.

Electricity Committee. Accepted. Switch and transformer kiosk at Brede Hall (£692).—Met.-Vick. Elecl. Co.

Hull.—Electricity Committee. Accepted. Extensions to coal-handling plant (£8,536).—Babcock & Wilcox, Ltd.

Kettering.—U.D.C. Electricity Committee. Recommended. One 6-panel and one 5-panel switchboard.—Switchgear & Cowans, Ltd. Two 3,000-kVA transformers.—British Electric Transformer Co.

Lanarkshire.—County Council. Accepted. Electrical work at the new school at Baillieston (£157).—Small & MacDonald.

Leyton.—Electricity Committee. Improvements, additions and modifications to the existing meter-testing apparatus :—

	£		£
A.E.G. Electric Co. Accepted ...	755	Chamberlain & Hookham ...	1,194
Aron Electricity Meter	966		

Special Coronation Committee. Accepted. Electrical floodlighting and illuminations during the Coronation festivities (£1,046).—British Thomson-Houston Co.

London.—SOUTHWARK.—Baths Committee. Recommended. Neon lighting at baths (£173).—Electric Sign Co.

GREAT WESTERN RAILWAY CO.—Accepted. 50-line intercommunication automatic telephone exchange at Paddington.—Automatic Telephone & Electric Co.

L.C.C.—Electrical work at the rear block of the new Fire Brigade Headquarters :—

	£		£
Holliday & Son (Electrical) ...	3,581	Read & Partners	3,726
Bower Engineering Works (Electrical and General). Accepted	3,564	Malcolm & Allan (London) ...	3,768
B. French	3,585	Troughton & Young	3,781
G. E. Taylor & Co.	3,641	Burdette & Co.	3,866
A. Hawkins & Sons	3,690	Francis Polden & Co.	4,226
		Pinchin & Walton	4,239

Accepted. Wiring and fittings for electric lighting in one block of dwellings on the Amias Place area, Finsbury (£469).—Jacob White & Co. This was the lowest of seven tenders, the highest being £605.

Wiring and fittings for electric lighting, &c., in the new dormitory block for nurses at the West Park Mental Hospital :—

	£		£
W. J. Furse & Co. (London). Accepted	573	W. H. Gaze & Sons	699
L. G. Tate & Co.	658	C. J. Ferguson & Sons	700
Springvale Electrical Co. ...	679	Evans & Shea	749
Blackburn, Starling & Co. ...	682	Twentyman & Willmott... ...	980
Buchanan & Curwen	692	Keeble, Ltd.	1,000

Plymouth.—Electricity Committee. Accepted. Fire protective apparatus for the Prince Rock power station (£413).—Pyrene Co. Coal-handling equipment at Prince Rock (£7,016).—Fraser & Chalmers.

Rotherham.—Transport Committee. Accepted. Trolley-vehicle chassis.—Guy Motors, Ltd.; Associated Equipment Co.

South Shields.—Transport Committee. Accepted. Twelve trolley-vehicles (£2,057 each).—Karrier Motors, Ltd. Overhead poles.—Stewart & Lloyds. Box panels.—Turners Asbestos & Cement Co. Box switches.—Parmiter, Hope & Sugden. Four section boxes.—A. Wiseman, Ltd. Overhead fittings.—M. Bonser, Ltd. Overhead equipment, insulators and wire.—B.I. Cables.

Town Council. Accepted. Electrical fittings.—B.T.H.; G.E.C.; B.I. Cables; Falk, Stadelmann & Co.; Newcastle General Supplies Co.; E.G.S. Co.; "Z" Electric Lamp & Supplies Co.; A. S. McHugh & Co.; Callender's; L. Andrew & Co.; Clang, Ltd.; J. H. Tucker & Co.

Wakefield.—Housing Committee. Accepted. Wiring 100 houses on the Peacock estate.—H. Smith (Westgate), Ltd.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, January 21st. Institution, London, W.C.2. 6 p.m. "Layout and Rupturing Capacity of Protective Devices in Motor Circuits." Mr. J. O. Knowles.

Mersey and North Wales (Liverpool) Centre.—Monday, January 18th. The University, Liverpool. 7 p.m. Paper by Mr. J. O. Knowles.

Western Centre.—Monday, January 18th. Royal Hotel, Bristol. 6.30 for 7 p.m. Annual dinner and dance.

East Midland Sub-Centre.—Tuesday, January 19th. The College, Loughborough. 6.45 p.m. "Lightning." Mr. B. L. Goodlet.

North Midland Centre.—Tuesday, January 19th. Hotel Metropole, Leeds. 7 p.m. "High Power Switchgear Testing Plant." Mr. J. S. Cliff.

North-Western Centre.—Tuesday, January 19th. Midland Hotel, Manchester. 6.45 for 7.15 p.m. Annual dinner.

Northern Ireland Sub-Centre.—Tuesday, January 19th. 9, Wellington Place, Belfast. 6.30 p.m. "Equipment and Performance of Steel Tank Rectifier Traction Sub-Stations Operating on the London Underground Railways." Mr. A. L. Lunn.

Tees-Side Sub-Centre.—Tuesday, January 19th. Cleveland Technical Institute, Middlesbrough. 6.45 p.m. Address by Mr. D. M. Buist.

Sheffield Sub-Centre.—Wednesday, January 20th. Royal Victoria Hotel, Sheffield. 7.30 p.m. "The Effects of Impulse Voltages on Transformer Windings." Messrs. T. E. Allibone, D. B. McKenzie, and F. R. Perry.

Dundee Sub-Centre.—Thursday, January 21st. University College, Dundee, 7.30 p.m. Paper by Messrs. T. E. Allibone, D. B. McKenzie, and F. R. Perry.

Irish Centre.—Thursday, January 21st. Trinity College, Dublin. 6 p.m. Paper.

Hampshire Sub-Centre.—Friday, January 22nd. South-Western Hotel, Southampton. Annual conversazione and dance.

Birmingham Electric Club.—Monday, January 18th. Grand Hotel, Birmingham. 7 p.m. Presidential address by Mr. H. Hooper.

Association of Supervising Electrical Engineers.—Tuesday, January 19th. E.L.M.A. Lighting Service Bureau, London, W.C.2. 7.15 p.m. "Compulsory Wiring Regulations and Registration." Mr. S. B. Donkin.

Royal Institution.—Tuesday, January 19th. 21, Albemarle Street, London, W.1. 5.15 p.m. "Electrical Conductivity in Solids." Mr. N. F. Mott.

Edinburgh Electrical Society.—Wednesday, January 20th. Philosophical Institute, Edinburgh. 8 p.m. "Modern Electrical Developments in Mining." Mr. R. Crawford.

Radio Manufacturers' Association.—Thursday, January 21st. Annual meeting and luncheon.

Notes

The London Power Co.'s Output

During 1936, 2,273,810,000 kWh was generated by the London Power Co., Ltd., an increase of 18.1 per cent. above the figure for 1935. Under 5 per cent. was consumed by the auxiliaries, compared with the national average in 1934-35 of 5.69 per cent. The highest number of kWh generated in one day exceeded nine million and the maximum demand was 582,400 kW. The system load factor (kWh generated) was thus 44.5 per cent. Battersea station produced 46.2 per cent. of the total output, generating 1,050,147,000 kWh, less than 5.2 per cent. of which was required for use in the station, the greatest number of kWh generated in one day being 4,344,000. The maximum demand was 194,600 kW, giving an annual station load factor of 61.5 per cent. The thermal efficiency was 29.14 per cent., compared with the 28.59 per cent. attained in the previous year.

A Breakdown at Barking

A 33-kV terminal end box on a section of the main busbars in one of the switch houses of the Barking "A" generating station, of the County of London Electric Supply Co., broke down at 3.20 a.m. on January 6th. The faulty section was disconnected and steps were taken to sort out resultant damage done to apparatus, such as busbar reactors, neutral earthing arrangements, auxiliary switchgear, interconnecting cables and the like. The supply from the two Barking stations was not interrupted beyond that furnished to the feeders connected to the faulty busbar section. The areas served by these feeders were affected for from half an hour to about one and a half hours, while alternative interconnections were being brought into use. The busbar short-circuit started a fire in the switch house, which was promptly and effectively dealt with by the CO_2 fire-extinguishing apparatus, and circulating earth currents due to the fault started a fire in Station "B" (affecting certain auxiliary electrical apparatus) which was put out by the fire-fighting equipment. Failures of supply to Grays (and sub-station fire) and to other parts of South Essex (cable fault) on January 7th and 9th are also reported.

National Certificate Awards

National certificates and diplomas in electrical engineering awarded in England and Wales by the Institution of Electrical Engineers in conjunction with the Board of Education numbered 1,197 in 1936, compared with 1,258 in 1935, the number of failures being 817 against 873. The awards comprised 735 ordinary and 374 higher certificates, beside fifty-three higher certificates endorsed, together with twenty ordinary and fifteen higher diplomas.

Finsbury Technical College Old Students

The annual dinner of the Finsbury Technical College Old Students' Association will be held on February 13th at the Trocadero Restaurant, W. Tickets (11s. 6s. each) can be obtained from the hon. secretary, Mr. F. R. C. Rouse, 15, Clifton Gardens, Golders Green, N.W.11.

Fatality

An inquest was held at Woodplumpton (Preston) on January 9th on Edmund Askew (29), farmer, who was found dead in a garage with an electric car heater in his hand. William Martindale, electrical engineer, Miles Street, Preston, who supplied Askew with the heater, said the cable was bare where it entered the holder, causing the framework to become "live" when the heater was switched on. The shock would be considerably increased by the fact that Askew was standing on a stone floor. The supply was a.c. at 230 volts. Customers were always advised to use this apparatus from a three-pin plug, particularly when they stood on a stone floor. The verdict was "Accidental death from being electrocuted."

Appointments Vacant

Electrician for Royal Earlswood Institution.

Meter superintendent for Walsall Electricity Department.

Electrical engineering assistants in the drawing office for the Air Ministry.

Draughtsman for Paisley Electricity Department.

Two installation inspectors for Bromley Electricity Department.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following :—

MOTOPHONE electric tables.

SCIATO sign.

LIGHTHOUSE batteries.

Bi-metallic device for insertion in bayonet lampholder so as to cause flicker when wattage of lamp inserted exceeds 40.

Readers should enclose stamped addressed envelopes when making their inquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. L. A. Catlin, general manager, and **Mr. M. J. Pattison,** London manager, of the E.M.B. Co., Ltd., have been appointed to the board of that company.

At the invitation of the staff the directors of W. T. Henley's Telegraph Works Co., Ltd., attended a meeting in the head office social club room on Friday last. Sir Maurice Simpson was unable to attend owing to a cold, and Mr. A. H. M. Jacob, secretary to the company, was also absent owing to indisposition. Mr. B. C. Wilkins, the chief accountant, said that the directors had been invited to receive from the staff a tangible appreciation of their regard, and he presented to Sir Montague Hughman (chairman) and Messrs. W. F. Bishop, J. Lamont and W. McLelland gold fountain pens, each engraved with the recipient's name and the words "Henley Staff, 1937." Presentations to Sir Maurice Simpson and Mr. Jacob will be made at a later date. The same day Sir Montague made a presentation of a portable typewriter from members of the staff to Miss H. Sneddon, who, after thirteen years' service with the company, is leaving for Johannesburg.

Mr. J. G. Park, who was formerly at the district office of the Electricity Board for Northern Ireland at Banbridge, Co. Down, informs us that his address now is 59, Bathurst Walk, Iver, Bucks.

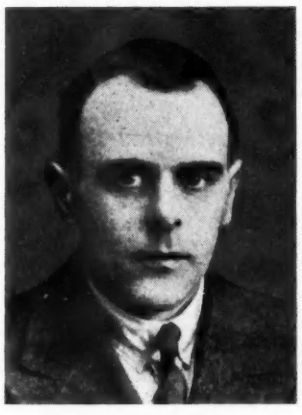
According to *Bus-Bar* (the staff magazine of the London and Home Counties Joint Electricity Authority), **Alderman J. Chuter Ede,** M.P., chairman of the Authority, is to be the next president of the British Electrical Development Association.

We are asked by Smith Meters, Ltd., of Streatham Vale, to say that statements to the effect that **Mr. H. E. Angold,** A.M.I.E.E., has left their service are without foundation.

Mr. A. S. Radford, D.I.C., B.Sc., A.R.C.S., is now in control of the Technical Section of the Marconiphone Co. This change has become necessary by the advent of television, and Mr. Radford will organise the Technical Section and its extensions.

Mr. B. G. F. Robins, for several years with Thomas De La Rue & Co., has been appointed sales manager of Synplas, Ltd. **Mr. C. H. Lumley,** who has held the position of sales manager, is now general manager of the company.

Mr. Arnold Earls, B.Sc., A.M.I.E.E., whose appointment as burgh electrical engineer at Rothesay was announced in our last issue, graduated at Queen's University, Belfast, and served his apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd. Later he was in the Design Department of the British Electric Transformer Co., and in 1932 he joined the staff of the Electricity Board for Northern Ireland, where he has since been, first as district engineer and latterly as area manager.



Mr. Arnold Earls

Miss J. Dicks, managing director of Dicks, Ltd., Winchester, has become engaged to Mr. Ian McVean. Miss Dicks was the first lady member of the Electrical Contractors' Association.

Sir William Ray is resigning his seat as M.P. for Richmond, and is applying for the Chiltern Hundreds immediately. It will be recalled that Sir William relinquished the position of Executive Director of the Electrical Development Association about a year ago. His continued ill-health is the cause of his retirement from Parliament.

Mr. A. C. Wilkins, who for forty-six years has been on the staff at the War Department central power station at Aldershot, has retired, and has been presented by his colleagues with a barometer.

Mr. J. E. Albrow, mains superintendent of the Bradford Corporation Electricity Department, has retired after thirty-nine years' service. A presentation, made to him by the deputy city electrical engineer, Mr. W. Dundas, was attended by the chairman and deputy chairman of the Electricity Committee.

Mr. H. J. Ward has resigned the chairmanship of J. & E. Hall, Ltd., but will continue to be a director. **Lord Dudley Gordon** has been appointed chairman.

Directors of W. T. Henley's Telegraph Works Co., Ltd., receiving a presentation from the staff of the company

Mr. B. L. Goodlet, B.A., A.M.I.C.E., A.M.I.E.E., has been appointed Professor of Electrical Engineering at the University of Cape Town. Mr. Goodlet was educated at Sheffield and Cambridge Universities. He received his training with Vickers, Ltd., and the Metropolitan-Vickers Electrical Co., Ltd., and later remained with the latter company, having held the successive posts of technical assistant, engineer in charge of the million-volt research laboratory, and research engineer. He is the author of several papers on high-voltage engineering and has been twice awarded the Kelvin Premium by the I.E.E. He succeeds Prof. H. Bohle at Cape Town.

Mr. B. L. Goodlet

Mr. H. W. Bosworth, managing director of Lancashire Dynamo & Crypto, Ltd., has returned from South Africa, where he has visited the Johannesburg Exhibition and the company's agent in South Africa, Natal, etc.

Obituary

Mr. B. P. Scattergood.—The death occurred on January 10th at the age of seventy-four of Mr. Bernard Page Scattergood, F.S.A., M.I.E.E., governing director of Scattergood & Johnson, Ltd. Mr. Scattergood received his training at the Physical Laboratory, Oxford, Leeds University, Greenwood & Batley, Ltd., and Kitson & Co. He commenced his career with the House-to-House Electricity Co., and later joined John Fowler & Co., Ltd. In 1906 he became sole proprietor of the firm of Scattergood & Johnson.

Mr. J. Gartshore.—The death occurred on January 6th, at the age of sixty-seven years, of Mr. John Gartshore, who had been associated for over thirty-eight years with the Wolverhampton Corporation Electricity Department. He retired from the post of mains assistant two and a half years ago. He went to Wolverhampton from the Bournemouth and District Electric Light Co., and was associated with the Electric Construction Co., of Bushbury. He erected the first overhead line in Douglas, Isle of Man.

Mrs. Gray.—The many friends of Mr. James Gray, of the Electric Construction Co., Ltd., will, we are sure, wish to associate themselves with us in an expression of deep sympathy with him in his bereavement. Mrs. Gray died on January 12th at Treesbank, Gordon Avenue, Stanmore.

Will.—Mrs. Ida Laura Byng, widow of Mr. Gustav Byng, left £74,748 (net personalty £60,161).

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

Apex-Vactric, Ltd.—Private company. Registered January 4th. Capital, £40,000. Objects: To carry on the business of manufacturing, buying, selling, dealing with and distributing washing and ironing machines, refrigerators and electrical appliances of all kinds, &c., and to adopt an agreement with the Apex Electrical Manufacturing Co. The directors are: S. K. Tubbs, 34, Manor Road, Barnet, C. T. Pegley, Ingram Lodge, Ingram Avenue, N.W.11 (managing director of Vactric, Ltd.), W. C. Pegley, Cedarcourt, Somerset Road, S.W.19 (director of Vactric, Ltd.), E. C. Stacey. The Priory, Eynsford, Kent, C. G. Frantz, 2311, Stillman Road, Cleveland Heights, Ohio, U.S.A. (President of Apex Electrical Mfg. Co.), and D. G. Meldrum, 31, Langland Gardens, N.W.3. Registered office: 24, Basinghall Street, E.C.2.

Bye Radio, Ltd.—Private company. Registered January 5th. Capital, £1,000. Objects: To acquire the business of a radio dealer now carried on by P. S. Greenhill at 16, Pier Street, Ventnor, Avenue Road, Freshwater, and Radio House, High Street, Niton, I.W., as Bye Radio. The directors are: P. S. Greenhill (permanent managing director) and Mrs. M. Greenhill, both of "Southward," St. Lawrence, Ventnor, I.W. Secretary: Muriel Greenhill. Registered office: 16, Pier Street, Ventnor, I.W.

Vitavox, Ltd.—Private company. Registered January 8th. Capital, £2,000. Objects: To carry on the business of manufacturers of, agents for, and dealers in wireless and television sets, loudspeakers, microphones, &c. The permanent directors are: A. Young, 47, Bush Grove, Stanmore, and L. Young, Berystede, Bury Avenue, Ruislip.

Electro-Generators, Ltd.—Private company. Registered January 8th. Capital, £2,000. Objects: To carry on the business of general and electrical engineers, welders, metal workers, and manufacturers of welding plant, &c. The permanent directors are: A. Hammond and S. Hammond, both of Boxted, Wellington Street, Slough. Secretary: E. Hammond. Registered office: Bath Road, Cippenham, Slough.

Barber (Signs), Ltd.—Private company. Registered January 6th. Capital, £500. Objects: To acquire the business of S. E. Barber (Signs) carried on at Chase Road, Southgate, N.14, and to carry on the business of sign manufacturers, designers and contractors, including electrical and neon signs, &c. The directors are: S. E. Barber (permanent), 23, Wynchgate, N.14, and K. J. Price, 6, Cannon Hill, N.14. Registered office: Newby's Yard, Chase Road, Southgate, N.14.

Rogers Battery & Electrical Service Co., Ltd.—Private company. Registered January 2nd. Capital, £1,000. Objects: To carry on the business of automobile, ignition and general manufacturers and repairers, &c. The directors are: Wm. F. Rogers, 30, Northwood Avenue, Purley, Surrey, and V. G. Rogers, The Cottage, 67-9, Hornsey Rise, N.19.

Dynaport Radio & Television, Ltd.—Private company. Registered January 4th. Capital, £10,000. Objects: To carry on the business of manufacturers of and dealers in dynamos, refrigerators, gramophones, wireless and television components, &c. The directors are: R. B. Whittingham, Oak Dene, Manor Road, South Esher, and N. N. Peck, 2, Richmond Park Road, East Sheen, S.W. Registered office: 18 and 19, Gorst Road, Acton, N.W.10.

Ergos Engineering Co., Ltd.—Private company. Registered December 29th. Capital, £5,000. Objects: To adopt an agreement with Henry F. Pulitzer, to carry on the business of electro-metallurgy in all its branches, and that of engineers, &c. The subscribers are: H. W. Brown, 72, Felstead Road, Orpington, Kent, and W. H. Walford, 10, Lambourne Road, Leytonstone, E.11. Registered office: Premier House, 150, Southampton Row, W.C.1.

North East Wires, Ltd.—Private company. Registered January 4th. Capital, £6,000. Objects: To carry on the business of manufacturers of and dealers in insulated electrical conductors, cables, wires, cords, dynamos, motors, armatures, magnetos, batteries, &c. The subscribers are: W. Patterson, 22, Claremont North Avenue, Gateshead, Co. Durham, and R. Thurgood, 7, Olive Gardens, Low Fell, Gateshead, Co. Durham. Solicitors: Stanton, Atkinson & Bird, 46, Grainger Street, Newcastle-on-Tyne.

William Graham, Ltd.—Private company. Registered January 2nd. Capital, £100. Objects: To construct and maintain wireless signal stations and to carry on the business of consulting wireless experts, designers and manufacturers of and dealers in all kinds of wireless, electrical, radio and telephone appliances, &c. The directors are: W. Graham, 27, Sefton Street, Brierfield (director of Multi Relays, Ltd.), and W. Roberts, "Craigmore," Blacko, Nelson (director of Multi Relays, Ltd.). Registered office: 31, Hill Street, Brierfield, Lancs.

Northern Electrical Distributors, Ltd.—Private company. Registered January 6th. Capital, £100. Objects: To carry on the business of manufacturers of, agents for and dealers in electrical and mechanical apparatus, accessories and components, and in particular of radio sets and valves, &c. The permanent directors are: D. J. Jones, 33, Blackfriars Street, Manchester, Arthur E. Underwood, 426, Wilmslow Road, Handforth, Ches, and Wm. S. Ajello, 19, Brentwood Drive, Cheadle, Ches. Registered office: 11, Watling Street, Manchester.

British Klockner Switchgear, Ltd.—Private company. Registered January 2nd. Capital, £10,000. Objects: To carry on the business of electrical engineers, manufacturers and constructors of and dealers in all kinds of electrical switchgear, electrical control devices and electric cables, fuses, wires, lines, accumulators, &c. The directors are: F. H. McCardie, address not stated, G. A. Haresnape, 32, Macaulay Court, S.W.4, and F. W. Parritt, address not stated.

Fort-Judd Batteries, Ltd.—Private company. Registered January 2nd. Nominal capital, £5,000. Objects: To acquire the exclusive rights of processes, patent and provisional patent rights of manufacturing electrical accumulators and batteries from P. W. Petter and G. F. Judd and all rights connected with the said processes, patents and provisional patents, for all foreign countries, and to carry on the said business and that of manufacturers and repairers of electric vehicles, &c. The first directors are: P. W. Petter, 12, Swallowcliffe Gardens, Yeovil (director of Petters, Ltd.), and G. F. Judd, 11, Earl Cottages, Earl Road, Bermondsey, S.E.1. Registered office: 5, The Park, Yeovil.

Girdler's Radio, Ltd.—Private company. Registered January 7th. Capital, £100. Objects: To acquire retail and radio business of E. Girdler, Ltd., and to carry on the business of retail dealers in, merchants of and agents for radio, television and electrical apparatus, &c. The permanent directors are: Esther S. Girdler, 228, Streatham Road, S.W.16; and E. W. Girdler, Bridge View, Angel Hill, Sutton. Registered office: 293, Mitcham Road, Tooting Junction, S.W.17.

Feneley & Co., Ltd.—Private company. Registered January 4th. Capital, £1,000. Objects: To acquire the business of Feneley & Co., electrical engineers and contractors, &c., Hale, Cheshire. The directors are: Clara Feneley (governing director and chairman), 61, Acacia Avenue, Hale, Cheshire; and S. R. Feneley, 179, Ashley Road, Hale, Cheshire. Registered office: 179, Ashley Road, Hale, Cheshire.

E. A. Hall, Ltd.—Private company. Registered January 4th. Capital, £1,000. Objects: To carry on the business of electrical contractors, mechanical engineers, manufacturers of and dealers in electrical machinery, wireless and television, &c. The subscribers are: E. A. Hall, 14, Willowgate, Grimsby; and L. Haigh, 50, Algernon Street, Grimsby. E. A. Hall is to be one of the first directors.

Returns of Electrical Companies

Brentwood District Electric Co., Ltd.—Satisfaction in full on November 12th, 1936, of debenture dated March 18th, 1936, and registered March 24th, 1936. (According to the register of mortgages, the debenture registered March 24th, 1936, originally secured all moneys due to bank.)

Brentwood District Electric Installations, Ltd.—Satisfaction in full on November 12th, 1935, of debenture dated March 18th, 1936, and registered March 24th, 1936. (According to the register of mortgages the debenture registered March 24th, 1936, originally secured all moneys due to bank.)

Seaton & District Electric Light Co., Ltd.—Satisfaction in full on November 12th, 1935, of debenture dated October 31st, 1934, and registered November 6th, 1934. (According to the register of mortgages, the debenture registered November 6th, 1934, originally secured all moneys due to bank.)

Sussex Electricity Supply Co., Ltd.—Satisfaction in full on November 12th, 1936, of debenture dated May 31st, 1934, and registered June 13th, 1934. (According to the register of mortgages, the debenture registered June 13th, 1934, originally secured all moneys due to bank.)

Salcombe Gas & Electricity Co., Ltd.—Satisfaction in full on November 12th, 1935, of debenture dated February 14th, 1935, and registered February 22nd, 1935. (According to the register of mortgages, the debenture registered February 22nd, 1935, originally secured all moneys due to bank.)

Mawdsley's, Ltd.—Satisfaction in full on November 12th, 1936, of debenture dated March 18th, 1936, and registered March 24th, 1936. (According to the register of mortgages, the debenture registered March 24th, 1936, originally secured all moneys due to bank.)

Furness Electrical, Ltd.—Satisfaction to the extent of £100 on December 24th, 1935, of debenture dated September 16th, 1935, and registered October 2nd, 1935.

Dunoon & District Electricity Supply Co., Ltd.—Satisfaction in full on December 30th, 1935, of debenture dated February 28th, 1930, and registered March 10th, 1930. (According to the register of mortgages, the debenture registered March 10th, 1930, originally secured £7,500 and further advances with a premium of 10 per cent. on the maximum amount at any time due.)

Leominster Electric Supply Co., Ltd.—Satisfaction in full on November 12th, 1935, of debenture dated May 31st, 1934, and registered June 18th, 1934. (According to the register of mortgages, the debenture registered June 18th, 1934, orginally secured all moneys due to bank.)

Central Distributors, Ltd.—Satisfaction to the extent of £2,000 on December 29th, 1936, of debenture dated June 17th, 1936, and registered June 26th, 1936. (According to the register of mortgages, the debenture registered June 26th, 1936, originally secured £3,000.)

Conway, James & Co., Ltd.—F. Dodd, of Bank Chambers, High Road, Peckham, was appointed receiver and manager on December 28th, 1936, under powers contained in first debentures dated June 17th, 1936.

McNaught (Lamps), Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated December 11th, 1936, to secure £1,016. Holder: N. Cook, 18, Exchange Street, Manchester.

Cawnpore Electric Supply Corporation, Ltd.—Particulars filed of debenture stock to secure £300,000 and premium of 2 per cent. authorised September 28th, 1935, and covered by trust deed dated December 15th, 1936, constituting a specific mortgage on certain immovable property in Cawnpore, all build-

ings thereon and machinery and fixtures, and a floating charge on the company's undertaking and other property, licences and concessions, including uncalled capital. The whole amount is now issued. Trustees: Beaver Trust, Ltd. (The total amount of the stock for the time being issued and ranking *pari passu* therewith is not to exceed the issued and paid up capital of the company.)

Heywood Relay Services, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated December 2nd, 1936, to secure £5,000. Holders: Practical Clothing and Supply Co., Ltd., 59, Duke Street, St. Helens.

Brunwec, Ltd.—Deposit, on December 29th, 1936, of deeds of 21, Cumberland Street, St. Paul's, Bristol, and debenture, of same date, charged on the company's undertaking and property, present and future, including uncalled capital, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Western Electrical Power Co. (Liverpool), Ltd.—G. F. Saunders, of 3, Lord Street, Liverpool, was appointed receiver on January 2nd, 1937, under powers contained in debenture dated December 21st, 1936.

Westmorland and District Electricity Supply Co., Ltd.—Satisfaction in full on December 30th, 1936, of debenture dated December 7th, 1934, and registered December 10th, 1934. (According to the register of mortgages the debenture registered December 10th, 1934, originally secured £150,000 and further advances).

Bylock Electric, Ltd.—Satisfaction to the extent of £500 on November 30th, 1936, of debentures registered January 13th, 1936, securing £4,500.

Ringmer and District Electricity Co., Ltd.—Satisfaction in full on December 30th, 1936, of debenture dated March 1st, 1933, and registered March 9th, 1933. (According to the register of mortgages the debenture registered March 9th, 1933, originally secured £20,000 and premium of 10 per cent. and all further advances).

R. Darbyshire, Ltd.—Charge on 23, Poulton Street, Fleetwood, Lancs, dated December 23rd, 1936, to secure £1,117 15s. and any further advances. Holders: Bingley Building Society.

John I. Hall & Co., Ltd.—Debenture charged on the company's property, present and future, including uncalled capital, dated December 3rd, 1936, to secure £400. Holder: C. Jenyon, "Hay Tor," Priory Avenue, Hastings.

Gambrells Rowse & Snoaden, Ltd.—Debenture charged on the company's assets, present and future, including uncalled capital, dated December 21st, 1936, to secure all moneys due or to become due from the company to J. Henry Schroder & Co., 145, Leadenhall Street, E.C.3 .

City Notes

Heenan & Froude, Ltd.—Particulars of this company were published on January 7th to comply with Stock Exchange Regulations. The company was incorporated in 1902 as a private company to acquire the business of engineers, &c., which had been carried on under the name of Hammersley Heenan at Manchester and Birmingham since 1881. In 1904 the present business was transferred to Worcester. The company was converted into a public company on December 30th last. It has an authorised capital of £250,000 in 5s. shares. There are no debentures outstanding. An issue of 221,765 shares has been made to Dawnay Day & Co., of Moorgate, at a price of 7s. 6d. each. This will bring the issued capital up to £150,000 and enable the company to pay off an unsecured loan of £27,000 and a bank overdraft of £45,000 appearing in the balance sheet at August 31st. The mortgage of £6,600 has already been paid off. The issue will provide working capital of approximately £6,083. The average profits of the company for the last eight years have amounted to £16,221. This represents over 10½ per cent on the issued share capital of £150,000, and based on last year's profits the return is over 14 per cent. Since February last the company has held the whole of the issued shares of Court Works, Ltd., of Madeley, Shropshire. This company specialises in malleable and grey iron castings for the motor-car, electrical and general engineering trades. The directors estimate that since August 31st, 1936, the aggregate profits of the two companies have been at the rate of £29,000 a year. The business of Heenan & Froude now falls into two departments. One covers dynamometers (hydraulic and electric), testing plant for aeroplanes, water, air and coil coolers, filters, excavators, conveying and handling equipment and other special forms of engineering. The other department deals with refuse disposal plants, including incinerators for municipal and industrial purposes. Orders in hand for these municipal plants are now in excess of £100,000, and inquiries have been received for further plants in the United Kingdom calling for an expenditure of about £500,000.

Increases of Capital.—The nominal capital of the following companies has recently been increased to the extent shown:—Barton & Sons (1935), Ltd., from £175.000 to £250.000; Barbados Electric Supply Corporation, Ltd., from £100.000 to £200.000; East Suffolk Electricity Distribution Co., Ltd., from £50,000 to £80.000; Trent Valley and High Peak Electricity Co., Ltd., from £100,000 to £150.000; South Somerset and District Electricity Co., Ltd., from £75.000 to £125.000; Buckrose Light & Power Co., Ltd., from £100 000 to £150 000; Wigtownshire Electricity Co., Ltd., from £100.000 to £120 000; Shoreham and District Electric Lighting & Power Co., Ltd., from £100.000 to £125.000; South Cumberland Electricity Supply Co., Ltd. ,from £75 000 to £100 000; Electricity Co. of Macclesfield, Ltd., from £300,000 to £350.000.

British Lead Mills, Ltd.—Lists opened on Tuesday last for subscription to an offer of 425.000 ordinary shares of 2s. each at 5s. per share. The company was formed on January 1st, 1937, to take over the business of Brilmill, Ltd. (formerly British Lead Mills, Ltd.). The business of the vendor company, which was formed in 1932, has shown constant expansion, and consists of the production of lead sheets and pipes, lead conduits for gas and electricity, lead tapes, rods, and wires, and lead products for the chemical trade.

The Westinghouse Brake & Signal Co., Ltd., reports a profit for the year ended September 30th last of £260,765, after bringing in dividends, interest and £16,496 transferred from reserve for losses of subsidiary companies, and providing for tax, depreciation, &c. This compares with £175,456 for the preceding year, and with £42,667 brought in, the total available is £303,432. Reserve receives £70,000, and pensions reserve £45,000. The dividend for the year is 10 per cent., plus a bonus of 5 per cent., and £60,061 is carried forward. The dividend for 1934-35 was 10 per cent., but no bonus was distributed.

Hick, Hargreaves & Co., Ltd.—Particulars of this company were published on Tuesday last in compliance with Stock Exchange regulations. The company was incorporated in England in 1892 to acquire the assets of a company which was formed in 1833, under the title of Benjamin Hick & Son, and which later became Hick, Hargreaves & Co. The authorised and issued capital is now £240,000 in £1 shares. The main works ouput comprises the manufacture of large surface condensing plants, feed water heaters, evaporators, de-aerators and other large power station auxiliary equipment. Condensing plant contracts now under construction include a 75,000-kW plant for Barking power station, a 50,000-kW plant for Ironbridge power station, and two 30,000-kW plants for the Littlebrook power station of the Kent Electric Power Co. Other products include industrial steam turbines, turbo and rotary air-compressors, &c. The company also does a large business in maintenance and repair work and renewal of existing power equipment through four subsidiary concerns.

The Electrolytic Zinc Co. of Australasia has declared interim dividends of 6 per cent. on the preference and ordinary shares (against 4 per cent.).

The London Electric Transport Finance Corporation, Ltd.—The list of applications was to open yesterday (Thursday) for an issue of £9.650,000 of £2 10s. per cent. guaranteed debenture stock at £92 10s. per cent. By this issue the total sum raised will be brought up to £39,966,250. The sum of £32,000,000 was issued in July, 1935, at 97, but owing to the altered conditions in the market for fixed-interest securities, the present issue is offered at cheaper terms. The stock, if not previously redeemed, will be repaid at par at the Bank of England on August 1st, 1955, but the Corporation reserves the right, on giving three months' notice, to redeem the whole stock or any part thereof on August 1st, 1950, or any half-yearly interest date thereafter. The Corporation's borrowing powers are fixed at £40.000,000, so that it has now practically reached its existing limit. Its purpose is to finance schemes of the London Passenger Transport Board, the G.W.R. and the L.N.E.R.

International Combustion, Ltd., reports a profit for the year ended September 30th last of £170,150, as compared with £114,800 for 1934-5. In the latter year £51,667 was credited from reserves no longer required, making £166.467. The net profit is £164,050, which, with £25,192 brought in, makes £189,242 available. Reserve receives £50,000, and the final ordinary dividend is 12½ per cent., plus a cash bonus of 10 per cent., making 30 per cent. for the year (against 20 per cent.), and £24,733 is carried forward.

Companies Struck Off the Register.—The names of the following companies have been struck off the Register, and they are thereby dissolved:—Blackburn Radio & Electrics, Ltd.; Electrical Fixed Trust, Ltd.; Hixon's Electrical Laboratories, Ltd.; Hygrade Electric, Ltd.; Newbury Electrical Co., Ltd.; Rowe's Radio & Electrical Service, Ltd.; Streeters Radio, Ltd.

Newman Industries, Ltd., has announced a final dividend of 6 per cent. on the preferred ordinary shares, plus an additional 2 per cent., making 8 per cent., calculated from April 3rd to December 31st.

Newman & Watson, Ltd.—At a meeting held on January 11th a resolution was passed increasing the capital to £160.000 by the creation of 400,000 new ordinary shares of 2s. each. Of these, 200,000 will be issued to ordinary shareholders at 3s. per share.

J. & E. Hall, Ltd., are paying a dividend of 8½ per cent. on the ordinary shares for the year ended September 30th (against 6 per cent.).

Stocks and Shares

TUESDAY EVENING.

THE course of business in most of the Stock Exchange markets continues to be satisfactory in regard to the volume of orders and the willingness on the part of the public to employ money not required for trade or taxation purposes. The first two months of the year usually produce a good deal of selling of stock, the proceeds of which are required to meet income and surtax demands, but up to the present, this particular source of supply has not been prominently apparent. One of the features of the moment is the manner in which the prices of base metals and commodities are forging ahead. The electrical industry is held responsible for requirements which influence the price of copper and certain of the other base metals.

The official figures published of the progress made by the grid and by the manufacturing companies, indicate that there is little, if any, slackening in the activity which revolves round these two. Investment goes on steadily in the shares of companies which deal with electrical plant, etc. Attention is directed to the better results shown last month by the Cable and Wireless combine. New issues are taken readily, where attractive stock and shares are offered. As an instance, however, of public discrimination, it may be remarked that underwriters of new issues cannot count with complete confidence, upon being relieved from the full extent of their obligations in every case.

London Electric Transport Loan

It is fair to assume that full subscription awaits the new issue of £9,650,000 London Electric Transport Finance Corporation 2½ per cent. guaranteed debenture—to give the full title to this clumsily-named stock. The issue price is 92½, and as the existing stock stands at 93, the Corporation's advisers are obviously "giving nothing away." Investment is, however, sharp-set for such security and in spite of the huge amount of the loan, required for the financing of Home Railway expansion, the money will probably be subscribed at once. Three years' work for 25,000 men will be given, it is estimated, by the proposed expenditure of 14½ million pounds upon the modernisation of railway services in London alone.

Recent Issues

A damping down of bullishness in industrial markets as a whole sufficed to check the rise in Crabtree Electrical, but left sufficient support to enable the inevitable bout of profit-taking to be withstood fairly comfortably at round about 32s. Thorn Electrical and Walsall Conduits fared less well, the former giving way from 15s. 6d. to 14s. 3d., and the latter from 32s. 3d. to 31s. 6d. Among other newcomers, Dictograph Telephones, 2s. 3d., and Radio Rentals, 9s., were maintained at their previous levels.

Electrical Equipment Shares

The restricting effect on buying power of the course of Continental politics is reflected, although not to any great extent, in the list of electrical equipment shares, where a tendency towards irregularity in prices is evident. In their new guise of 5s. units, Henleys are quoted at 21s. 6d., as compared with 4½ before sub-division of the old £1 shares. The preference, previously of £5 each and now split into £1 units of stock, are called 27s. 6d. Other cables shares are irregular: Callenders and Siemens lost ground, but Enfields put on 3/16, to 5¾, and British Insulated continued strongly in favour up to 6½. A small loss is shown by London Electric Wire, at 39s. English Electric issues, although less active, are distinctly firm. General Electric and Associated Electrical, on the other hand, lost 1s. each. Reyrolles went from 77s. 6d. to 75s. before rallying partially to 76s. 6d. Revival of interest in telephone descriptions lifted Ericssons to 56s. 3d., and Hall Telephones to 28s. Westinghouse Brakes, now 75s. 9d., turned easier shortly before the dividend announcement: that the distribution of 15 per cent. coincided with expectation. Consolidated Signal dropped from 147s. 6d. to 140s.

Traction and Transport

The price of Brazilian Tractions has crossed the 20 mark, having advanced during the past week by as much as 1¼. Following last year's resumption of cash dividends, the market is hopeful that the latter will, in future, be placed on a regular quarterly basis. South American issues generally continue to hold a good deal of speculative attention. Among them, Anglo-Argentine Tramways first preference moved up 1s., to 6s. 9d., after the passing of the Transport Co-ordination Bill. Of the Home companies, British Electric Traction deferred dipped, at one time, from 1625 to 1590, but recovered to 1600. Thomas Tillings are down from 77s. 3d. to 75s. 9d., and West Riding are on the dull side, at 47s. 6d.

Canadian Power

When, last October, the 1935-1936 results of British Columbia Power Corporation were discussed here, the price of the "A" shares was 32, and that of the "B," 4. Renewal of public interest in the shares, stimulated, then, by the disclosure of a revival in earning power, has since been increased by evidence of a maintenance of the improvement, brought about by industrial recovery in Canada, and by a belief that schemes are in hand for bringing about a reduction in interest payable on the prior charges. Buying based on these considerations has been so persistent as to nearly treble the price of the "B," which stand now at 11, and to lift the price of the "A" to 39½, ex-dividend. The former shares rank for dividend only after a non-cumulative $2 per share has been paid, in one year, on the "A," which then participate equally with the "B" up to $5 per share. The "A" shareholders are now receiving quarterly payments of 40 cents.: optimism looks for an eventual resumption of the full 50 cents. rate, and the opening of the door to a first distribution on the "B." Both classes are quoted in the Stock Exchange Official List.

Miscellaneous Matters

Transatlantic communication stocks joined in a general Wall Street rally, following Mr. Roosevelt's Budget message to Congress, but prices were inclined, later, to tail off. American Telephone and Telegraph lost a rise from 187½ to 189, and Internationals, too, reacted from 13¼ to 12¾. Western Unions put on 2 points to 81¼. Canadian Marconis jumped from 7s. 3d. to 10s., in response to an outburst of speculative buying. Montreal operators have been picking up the shares. Cable and Wireless stocks resisted well a certain amount of selling inspired by the tenseness of international affairs. Gilt-edged stocks, also, refused to be flurried to any noticeable extent by the same factors. The market for Home electricity supply shares is lifeless but steady; in the foreign group, Palestine "A" shares weakened further to 45s. Business in the rubber market is of the spasmodic order while the price of the commodity fluctuates somewhat widely around the 10d. mark.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend. Previous.	Dividend. Last.	Price. Jan. 12.	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	77/6	—	3 17 5
City of London	1	7½	7½	37/6	—	4 0 0
Clyde Valley	1	7	8	45/6	—	3 9 7
County of London	1	10½	10½	54/–	—	3 17 9
Edmundson's 7% Pref.	1	7	7	35/6	—	3 18 0
Do. Ord.	1	8	8	44/6	—	3 12 0
Elec. Dis. Yorkshire	1	9	9	45/–	—	4 0 0
Elec. Fin. and Securities	1	12½	12½	3 1/16	—	4 1 7
Elec. Supply Corporation	1	11	11	58/3	—	3 15 7
Lancs Light and Power	1	7½	7½	38/–	—	3 19 0
Lond. Assoc. Electric	1	—	7	35/–	—	4 0 0
London Electric	1	7	8	40/–	—	4 0 0
London Power Deb. Red.	Stock	5	5	107½	—	4 13 0
Metropolitan	1	10	10	50/6	—	3 19 2
Midland Counties	1	7	7½	2	—	3 15 0
Mid. Elec. Power	1	8	8	42/6	—	3 15 3
North Eastern Electric Ordinary	1	6	6	32/6	—	3 13 10
Do. 7% Pref.	1	7	7	35/–	—	4 0 0
Northampton	1	10	10	51/3	—	3 18 2
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	56/–	—	3 11 5
Do. do 6% Pref.	1	6	6	32/–	—	3 15 0
Scottish Power	1	8	8	42/–	—	3 16 2
South London	1	7	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	23/–	+6d.	6 10 4
Yorkshire Elec.	1	8	8	45/–	+6d.	3 11 0

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	120	—	4 3 5
Do. 1955–75	„	5	5	122	—	4 2 0
Do. 1951–73	„	4½	4½	113	—	3 19 8
Do. 1963–93	„	—	3½	103	—	3 8 0
London Elec. Trans. Gtd.	„	—	2½	93	—	2 13 9
London & Home Counties, 1955–75	„	4½	4½	114	—	3 19 0
London Passenger Transport, A	„	—	4½	122½	—1	3 13 6
Do. do. B	„	—	5	124½	—	4 0 4
Do. do. C	„	3½	4	98	—1	4 1 8
West Midlands Joint Elec. 1948–68	„	—	5	116½	—	4 5 10

TELEGRAPH AND TELEPHONE.

American Tel. & Tel.	$100	9	9	187½	—	4 16 0
Anglo-Am. Tel. Pref.	Stock	6	6	129½	—1	4 12 8
Do. Def.	„	1½	1½	32	+½	4 13 9
Cable & Wireless 5½% Pref.	„	4½	5½	102	—	5 7 11
Do. A. 7½% Ord.	„	Nil	Nil	22	—	—
Do. B. Ord.	„	Nil	Nil	6½	—	—
Globe Tel. & Tel. Ord.	10	3½*	4½*	14	—	3 4 3
Do. Do. Pref.	10	6	6	14½	—	4 5 0
Great Northern Tel.	10	20	20	46½	+½	4 6 0
Marconi-Marine	1	10	7½	37/6	—	4 0 0
Oriental Telephone Ord.	1	12*	12*	3 3/16	—	3 12 6

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	6/9	+1/–	—
Do. do. 2nd Pref.	5	Nil	Nil	5/–	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	28½	–2	—
British Electric Traction Df. Ord.	„	5	5	1600	—25	—
Do. do. Pref. Ord.	„	8	8	175½	—	4 11 2
Brazil Traction	100	—	70 cts.	20⅞	+1⅛	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	104¼xd	—	4 14 0
Mexican Light Common	100	Nil	Nil	3½	—	—
Do. 1st Bonds	$500	5	5	47	—	—
Victoria Falls Ord.	1	20	12	75/–	—	3 4 0
West Riding	1	5	6½	47/6	—1/16	2 14 8

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	15	3	—	5 0 0
Assoc. Elec. Ord.	1	6	8	51/–	—1/–	3 2 10
Do. Pref.	1	8	8	39/6	—	4 1 0
Babcock & Wilcox	1	8	8	54/–	—	2 9 3
British Aluminium Ord.	1	7½	7½	45/–	—6d.	3 6 8
British Insulated Ord.	1	15	20	6½	—	3 1 6
Brush Ord.	Stock	Nil	Nil	40½	—	—
Callender's	1	15	15	4	—1/16	3 3 1
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/–	12½	12½	3½	—	—
Do. 8% Pref.	1	8	8	2	—	4 0 0
Electric Construction	1	3½	7	42/6	—	3 5 9
Enfield Cable Ord.	1	25	25	5¾	+3/16	4 17 0
English Electric	1	Nil	Nil	32/–	+1/–	—
Do. Do. Pref.	1	6½	6½	26/6	—	4 18 1
Ericsson Tel.	5/–	24	20*	56/3	+1/16	1 15 10
Ever Ready	5/–	35	35	32/–	—9d.	5 9 5
Ferranti Pref.	1	7	7	28/9xd.	—	4 17 5
G.E.C. Pref.	1	6½	6½	34/–	—	3 16 4
Do. Ord.	1	10	15	93/–	—1/–	3 4 5
Henleys	5/–	30	30	21/6	—	3 6 8
Do. 4½% Pref.	1	4½	4½	1⅞	—	3 5 5
India-Rubber Pref.	1	1⅛	5½	23/3	—	4 17 9
Johnson & Phillips	1	7½	10	2½	+6d.	4 0 0
Lancashire Dynamo	1	5	10	3 5/16	—⅛	2 16 2
Siemens Ord.	1	4	6	33/9	—1/16	3 11 0
Telegraph Construction	£1	Nil	Nil	33/9	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be numbered and abridged and all subsequent proceedings will be taken.

1934.

15879. "Telegraphones and like magnetic-recording or pick-up apparatus." Marconi's Wireless Telegraph Co., Ltd., N. M. Rust and C. J. F. Tweed. May 15th, 1935. (458255.)

1935.

7692. "Manufacture of electric cables or other insulated conductors having mineral powder insulation." Conducteur Electrique Blindé Incombustible. March 12th, 1934. (458257.)

8273. "System for signalling by light-rays and wireless waves." J. Fodor. March 16th, 1935. (458307.)

11941. "Television cathode-ray tubes." Radioakt.-Ges. D. S. Loewe. April 20th, 1934. (Addition to 20744/36.) (458401.)

13954. "Thermionic valve relay." A. R. Thomas and Hutchinson's Testing Apparatus, Ltd. May 13th, 1935. (458308.)

14166. "Electrical circuit arrangements for electrical totalisators or the like." H. D. Black and A. A. C. Degen. May 14th, 1935. (458181.)

14552. "Railway track circuits." General Railway Signal Co. July 28th, 1934. (458356.)

17076. "Alternating-current circuit-breakers." British Thomson-Houston Co., Ltd., H. Trencham and H. E. Cox. June 13th, 1935. (458309.)

17081. "Electrical multiple-pin plugs and in particular electric wall plugs." C. R. Cook. June 13th, 1935. (458404.)

17310. "Electric torches." S. Wiseman. June 15th, 1935. (458409.)

17325. "Arc welding system." Babcock & Wilcox, Ltd. June 16th, 1934. (458269.)

17546. "Multi-channel carrier frequency transmission systems with echo-suppressors." Siemens & Halske Akt.-Ges. June 18th, 1934. (458419.)

17706. "Thermostats for electric ranges." Wilcolator Co. June 20th, 1934. (458426.)

17740. "Metal-clad electric switchgear." British Thomson-Houston Co., Ltd., C. F. Gimson and E. D. Regis. June 20th, 1935. (458431.)

17762. "Automatic telephone systems." W. C. De Vries. June 20th, 1935. (458436.)

17888. "Teleprinters." Creed & Co., Ltd., and R. D. Salmon. June 21st, 1935. (458444.)

17890. "Casings suitable for small electric apparatus such as tubular condensers." Standard Telephones & Cables, Ltd., and J. A. Leno. June 21st, 1935. (458445.)

17891. "Multi-way electric switches." Standard Telephones & Cables, Ltd., and H. H. J. Sparkes. June 21st, 1935. (458446.)

17927. "Electron-discharge device amplifiers." Marconi's Wireless Telegraph Co., Ltd., and G. M. Wright. June 21st, 1935. (458449.)

17929. "Electron-discharge device amplifiers. Marconi's Wireless Telegraph Co., Ltd., and O. E. Keall. June 21st, 1935. (458450.)

18104. "High-speed cathode-ray recording oscillographs or like apparatus." R. V. Whelpton and Metropolitan-Vickers Electrical Co., Ltd. June 24th, 1935. (458270.)

18655. "Electric pocket-lamps." L. Gerlach and A. Enders Akt.-Ges. June 29th, 1935. (458272.)

23167. "Electric transformers." Chamberlain & Hookham, Ltd., and S. James. August 17th, 1935. (458276.)

25244. "Railway or like signalling systems." Standard Telephones & Cables, Ltd., and A. Brown. September 11th, 1935. (458278.)

25364. "Electric motor control systems." British Thomson-Houston Co., Ltd. September 12th, 1934. (458377.)

25868. "Controlling systems for electrically driven lifts." General Electric Co., Ltd., and A. A. Chubb. September 18th, 1935. (458380.)

25869. "Controlling systems for lifts." General Electric Co., Ltd., and N. C. Smart. September 18th, 1935. (458198.)

26109. "Railway or like signalling systems." Standard Telephones & Cables, Ltd., and J. B. Griffiths. September 20th, 1935. (Addition to 412620.) (458279.)

26473. "Pole caps for electric alternators and synchronous motors." P. A. H. Mossay & Laurence, Scott & Electromotors, Ltd. September 24th, 1935. (458381.)

26606. "Drop or detector devices for electrically operated stop mechanism for use with creels used with warping mills, beaming machines, and looms and other machines for forming or operating on, or to be supplied with, warps or like assemblages of yarns or threads." F. Holt. September 26th, 1935. (Cognate application 12641/36.) (458280.)

26800. "Television systems." Scophony, Ltd., J. D. Baynes and G. Wikkenhauser. September 27th, 1935. (458382.)

27925. "Electric stoves." W. H. Simmons. October 10th, 1935. (458383.)

30402. "Loudspeakers." H. Vogt. November 3rd, 1934. (Cognate application 30403/35.) (458287.)

31409. "Apparatus for stopping electrically driven looms." Schorch-Werke Akt.-Ges. November 16th, 1934. (Cognate application 31410/35.) (458289.)

34404. "Relays and like devices having a three-position operating element." General Railway Signal Co. February 1st, 1935. (458212.)

1936.

426. "Partly electromagnetic switches." Mather & Platt, Ltd., and G. B. Alvey. January 6th, 1936. (458295.)

888. "Electric battery lamps." A. Gelardin. July 5th, 1935. (458327.)

2544. "Antenna for vehicles." British Thomson-Houston Co., Ltd. January 26th, 1935. (458217.)

4383. "Control of electric motors for driving vehicles." British Thomson-Houston Co., Ltd. February 16th, 1935. (458390.)

4923. "Methods of electric welding." British Thomson-Houston Co., Ltd. February 18th, 1935. (Addition to 449117.) (458334.)

5226. "Shields for anodes of electroplating plant." C. B. Cook, Jnr. February 21st, 1936. (458218.)

13284. "Multiplex transmission systems." Siemens & Halske Akt.-Ges. May 10th, 1935. (458225.)

15006. "Navigation-aiding radio systems." Telefunken Ges. für Drahtlose Telegraphie. May 27th, 1935. (458347.)

15818. "Radio receivers." Standard Telephones & Cables, Ltd. June 19th, 1935. (458235.)

18941. "Television receivers." Emyradio Soc. a. r. l. July 8th, 1935. (458242.)

18959. "Radiant lamps." B. M. G. Mann. July 8th, 1935. (458303.)

20294. "Holders for cartridge fuses." E. Heusser. July 23rd, 1935. (458245.)

23834. "Artificially cooled high-pressure mercury-vapour discharge tube." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 3rd, 1935. (Addition to 431923.) (458252.)

32124. "Manufacture of electric cables or other insulated conductors having mineral powder insulation." Conducteur Electrique Blindé Incombustible. March 12th, 1934. Divided out of 458257.) (458254.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from January 6th:—

Thermat. No. 569504. Class 11. Electrically heated blankets (not medicated) for use in relation to the health of men.—C. Harris, 510, Broadway, Letchworth, Herts.

Atlas. No. 572310. Class 13. Electric lamps (ordinary).—Atlas Lamp Works, Judd Street, King's Cross, W.C.1.

Oil Engine Costs

THE report on heavy-oil engine working costs compiled annually by the Diesel Engine Users' Association was considered by members at a meeting in London on January 13th.

It states that many public supply stations continue to be used chiefly for peak load and as grid breakdown plants; indeed, there also has been a tendency for industrial concerns to take a more or less steady "base" load from the local supply (for which they presumably pay very favourable terms) and to run their own Diesel engines to generate something like one-third of the total energy needed. On the other hand independent oil engine sets continue to increase in popularity for the rather isolated industrial works, such as brick works, &c., where considerable expense would be involved in connection to the main supply in the district.

Several returns from members arrived too late for inclusion in the current (1935-36) report; except for this the total number of stations included would have been sixty, the largest ever recorded. A completely new plant consisting of three modern airless injection engines, each of 1,183 b.h.p., has recently been installed at the Santa Barbara (chemical and textiles) plant in Lisbon. Automatically started and stopped oil engine generating and pumping sets are becoming increasingly popular. A station which includes two small sets of this nature is that at Framlington belonging to the East Anglian Electricity Supply Co. This plant includes no battery and the automatic sets are run during the later hours of the evening, after the peak.

The largest station mentioned is that at Broken Hill, New South Wales, totalling 15,300 kW (twelve engines). The cost was 0.461d. per kWh for a total of 177,573,774 kWh at 30.2 per cent. annual station load factor. The rated b.h.p.-hours run per gallon of lubricating oil reached 7,230, at a cost of 4s. 7d. per gal., fuel oil costing 120s. 8d. per ton. The average fuel consumption of all the fifty-six stations mentioned (0.642 lb. per kWh generated at 65.9 per cent. load factor) was 3 per cent. below the standard curve. Consumptions of thirty-eight stations were below standard, while the lubricating oil consumptions of twenty-three stations were better than the arbitrary standard of 2,380 rated b.h.p.-hours per gal.

Two sets of traction costs are included in the report. The Canadian National Railways supplied particulars of eighteen oil-electric rail cars, with trailers, and one shunting locomotive. Nine of them are fitted with Beardmore engines (comparative figures for the other nine, fitted with Westinghouse engines, are in parenthesis) and have run 2,645,918 (2,376,421) miles, or 440,813 (455,047) during 1935, or 48,979 (50,561) miles per annum per vehicle. The ratio of lubricating to fuel oil was 5 (3) per cent., and the costs were 1.37d. (1.52d.) per mile for fuel, 0.55d. (0.41d.) for lubrication, and 5.3d. (4.5d.) for repairs. During 1935 the shunting locomotive operated for 6,769 hours, using 6.3 gallons of fuel oil per hour in service. The lubrication ratio was 3 per cent. and the costs 1s. 11d. per hour for fuel, 6¼d. for lubrication, 1s. 0¼d. for repairs, and 1s. 1¼d. for maintenance wages.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alnwick.—Houses, Acklington Road; T. Fallow, 5, Westfield Crescent, Newbiggin.

Atherstone.—Extensions to works, for Vero & Everitt, Ltd., Station Street.

Audenshaw.—Houses (136), Snipe estate; McLellan & Abel.

Barrow-in-Furness.—Houses (66), Prospect Road; R. Bant.

Bedfordshire.—School, Badger's Hill, Luton, for E.C.; clerk, Shire Hall, Bedford.

Birkenhead.—Cinema, Claughton Road; Ritz Co.

Birmingham.—Additions to premises, Rockville Road (£50,000), with electrical work; S. F. Swift & Sons, builders, Alcester Street, Birmingham.

Blackpool.—Houses, Queen's Drive and Pennystone Road; G. Hodgson & Sons, Ltd. Houses, Warbeck Hill Road; J. Fielding & Sons.

Bradford.—Cinema, Broadway; Associated Cinema Properties, Ltd. Factory, Great Horton, for Courtaulds, Ltd.

Bristol.—Engineering works, Fishponds Mental Hospital (£29,950); E. S. Hoare, consulting engineer. Extensions to Connaught school (£13,934); E. A. W. Poole & Son.

Burnley.—Factory, Cronshaw Meadow, for Platers and Stampers, Ltd.; Wallis Gilbert & Partners, architects, 15, Elizabeth Street, London, S.W.1.

Carlisle.—Bus station, Scotch Street; United Automobile Services, Ltd. Reconstruction of premises, English Street; Dutton & Walton, architects.

Chanctonbury.—Houses (24); R.D.C. surveyor.

Chard.—Houses (35); R.D.C. surveyor.

Cheltenham.—Houses (188), Whaddon Farm; borough engineer. Development of Cakebridge estate; Rainger & Rogers, architects. Development of Prestbury Park estate; G. A. M. Hall.

Chorley (LANCASHIRE).—Munition factory (90-acre site), £4,000,000; Sir Lindsay Parkinson & Co., Ltd., builders, Talbot Road, Blackpool.

Coventry.—Offices, shops, &c., at the junction of Hales Street and Trinity Street, for Mills & Mills, Ltd., 33, Earl Street.

Derby.—School, Normanton (£42,890), for E.C.

Dumbarton.—Houses (77); John Lawrence (Glasgow), Ltd., builders.

Dundee.—Factory, Kingsway, for Valentine & Sons, Ltd.

Glasgow.—Offices and workshop, Jessie Street; Limmer & Trinidad Lake Asphalte Co., Ltd. Premises for the Ideal Products, Ltd., Howard Street; Cowieson, Ltd., architects, 3, Charles Street, Springtown Road, St. Rollox. Extensions to works, Lochburn Road; Kelvin Construction Co., Ltd. Extensions to Parkhead steelworks; Wm. Beardmore & Co., Ltd.

Gorleston-on-Sea.—School and school extensions (£21,250); H. R. Middleton & Co., Ltd.

Great Yarmouth.—Band enclosure (£22,291), baths, Hall Quay, and Council offices, Hall Plain (£21,134); borough engineer. Extensions to factory, Crittens Road; R. H. Porter, Ltd.

Halesowen.—Houses (103), Alexandra Road; A. & J. Mucklow.

Hastings.—Block of shops and flats, Tivoli estate, Battle Road; D. Newton Padgham, architect. Cinema, Cambridge Road; Union Cinema Co., Ltd.

Hereford.—Houses (26), Ross Road; F. McConnell & Co., Ltd. Factory, Racecourse site; Western Aircraft Sales, Ltd.

Huddersfield.—Houses, Fieldshead estate and Main Road; J. Ainley, architect, 26, Market Street.

Ilkeston.—Institute, Hallam Fields Road; Stanton Ironworks Co., Ltd. Extensions to factory, near Awsworth Road; A. Booth & Sons, Ltd.

Irish Free State.—(Co. OFFALY).—Schools, Ferbane and Shrinrone, for Offaly Vocational E.C., Tullamore; M. Grace, Castle Street, Oldcastle, Offaly, and Fergus J. Ryan, 3, Lower Abbey Street, Dublin.

Kendal.—Cinema for James Brennan, 181 Abbey Road, Barrow-in-Furness; Rainey Bros., Ltd., builders, Ironworks Road, Barrow-in-Furness.

Leadgate (Co. DURHAM).—Houses; T. J. M. Ripley, U.D.C. surveyor.

Lincoln.—Houses (150) and bungalows, Browning Drive site; city surveyor. Central market (£27,587); William Wright & Son (Lincoln), Ltd., builders. School, South Park (£50,274), for E.C.

Lichfield.—Extensions to factory, Beacon Street; Tuke & Bell.

London.—(EAST HAM).—Houses (28). Stevenage Road; R. J. Slater, architect, 199, Plashet Grove, E.6. (SOUTHWARK).—Factory, Borough High Street; Boreham, Sons & Wallace, 1, Museum Street, W.C.1.

Maidenhead.—Factory, White Waltham, for Rootes Securities, Ltd., on behalf of the Air Ministry.

Maidstone.—Swimming baths, Square Hill site (£35,800); A. W. S. and K. M. B. Cross, architects, 46, New Bond Street, London, W.1.

Manchester.—Cinema, Platt Lane and Hart Road, Rusholme, for H. Barnes, Ltd., 3, Water Street.

Market Harborough.—Extensions to works, Lathkill Street; J. Haddon & Co.

Morpeth.—Houses (30), Pegswood and Widdrington Station; T. T. Watson, architect, 7a, Bridge Street.

Mytholmroyd.—Houses, the Nest; Jackson & Fox, architects, Harrison Road, Halifax.

Newcastle-on-Tyne.—Houses, for C.C. (£500,000); city architect, 18, Cloth Market.

Northampton.—Houses (64), Kingsthorpe Road; T. Wilson & Son, Ltd. Shops, offices and arcade, St. Giles Street; Northampton Co-operative Society, Ltd. Houses (150), Spencer estate, and extensions to Transport depôt (£24,606); borough engineer.

Northamptonshire.—Extensions to county offices (£45,000), Northampton; county architect.

Oldbury.—Houses (20), Birch Farm estate; C. Nokes & Son. Houses (40), Garland Crescent; J. Harper & Sons (Blackheath), Ltd. Extensions to works, Rood Road; Tube Products, Ltd.

Peel (ISLE OF MAN).—School for E.C.; H. L. Fletcher, director of education, Strand Street, Douglas.

Plymouth.—Houses (24), Camel's Head estate; A. C. Jones. Houses (25), Pike's estate, Laira; Donald & Tucker. Theatre and hotel, Theatre Royal site; W. R. Glen, architect.

Portsmouth.—Houses (26), near Jubilee Avenue; G. Attwell. Halls, sports centre, &c., Lumps Fort site (£225,500); borough engineer.

Rainhill (LIVERPOOL).—Extensions to County Mental Hospital; R. Owens & Son, architects, Crosshall Street, Liverpool.

Reading.—Houses (100) and maisonettes (£45,020); Housing architect of the Council.

Redditch.—Houses, Beeley Road; U.D.C. surveyor.

Rotherham.—Houses (20), Bawtry Road; O. Parkin. Riverside development (£85,790); Gustavus Bailey, Ltd.

Rothwell (YORKSHIRE).—Houses, Robin Hood site; F. Hartley, architect, Council Offices.

St. Helens (LANCASHIRE).—Houses (168), Grange Park estate; borough surveyor.

Scarborough.—Premises, for the Midland Bank, Ltd. (£20,000); A. W. Sinclair, builder, Commercial Street.

Southport.—Extensions to Technical college, Mornington Road (£22,750); J. Partington, Ltd.

South Shields.—Houses, Cornwallis Square, for the North-Eastern Housing Association, and Horsley Hill; borough engineer. Shops, flats and garages, Sunderland Road, for W. R. Smith; Page, Son & Bradbury, architects, 67, King Street. Two schools, Cleadon Park, for E.C.

Southwold (SUFFOLK).—Houses (24); borough surveyor.

Stechford (BIRMINGHAM).—"Atlas Cinema," Flaxley Road (£35,000); Dare & Son, Ltd., builders, Ward End, Birmingham.

Stockton-on-Tees.—Houses (162); G. P. Stainsby, architect, 25, High Street.

Stretford.—Offices and flats, Stretford Road; Liverpool Victoria Friendly Society. Extensions to factory, Brunswick Street, for the Ideal Cooked Meat Co.; W. Shawcross. Extensions to works, Moss Park Road; C. McCardell & Co.

Surrey.—School, Chertsey, for County E.C.

Sutton Coldfield.—Shops and showrooms, the Parade, for Montague Burton, Ltd., Hudson Road, Leeds; W. & A. Forsdike, Ltd., builders, St. Mary's Row, Sheffield.

Swindon.—Offices and stores, College Street; J. Beswick & Son. Improvements to school (£13,000), for E.C.

Thurrock.—Cinema, George Street, Grays; Frank Matcham & Co., architects, 62, Oxford Street, W.1.

Wallsend-on-Tyne.—Cinema, High Street; Drury & Gomersall, architects, 15, Oxford Road, Manchester.

West Hartlepool.—Extensive alterations to the Grand Hotel for the L.N.E.R. (North-Eastern Area), York.

Widnes.—Cinema (1,021 seats), Peelhouse Lane, for the Cheshire County Cinemas, Ltd.; G. Owen, architect, Warrington.

Wolverhampton.—Houses (23), Lodge Road, Oxley; Brookes & Edwards. Extensions to factory, Park Lane; H. Meadows, Ltd. Extensions to Royal Hospital, Sutherland Place; Governors.

Worthing.—Offices, shops and stores, Dominion Road; T. Wall & Sons, Ltd.

E.A.W. Notes

MISS C. HASLETT, director of the Electrical Association for Women, will be the principal speaker at the business hour luncheon of the London Branch which precedes the annual general meeting on February 11th. Her subject will be "What of the Future?" The spring programme of the London Branch further includes social events, debates, lectures and visits to the E.L.M.A. Lighting Service Bureau, Croydon generating station, and the works of Evershed & Vignoles, Ltd., and Franco Signs. So popular have the repair classes been that no more applications can be accepted for this season, but it is hoped to resume them again in the autumn. Many inquiries have been received regarding the campaign for raising the status of the domestic worker; classes are starting this week in Wimbledon and it is hoped that others will be formed shortly. Several more schools are considering affiliation to the Association. The Demonstrators' Circle is holding its annual meeting on February 1st and a three-day course has been arranged for demonstrators and saleswomen at the E.A.W. Headquarters on March 1st, 2nd and 3rd. In addition, there will be a refresher course on five consecutive Fridays, commencing January 22nd. A full programme of lectures and visits is also planned. A lecture by Mr. V. H. Vale (G.E.C.) on the design and construction of the electric cooker and electric iron, and a visit to the "Ediswan" television laboratory, are fixtures arranged for the Teachers' Circle, whose annual general meeting is on January 20th.

Responding to the toast of "The E.A.W.," proposed by the Lord Mayor of Stoke-on-Trent at the annual dinner of the North-West Midlands Branch on January 7th, Mrs. Pender Chalmers said that the Association's greatest function was its educational work.